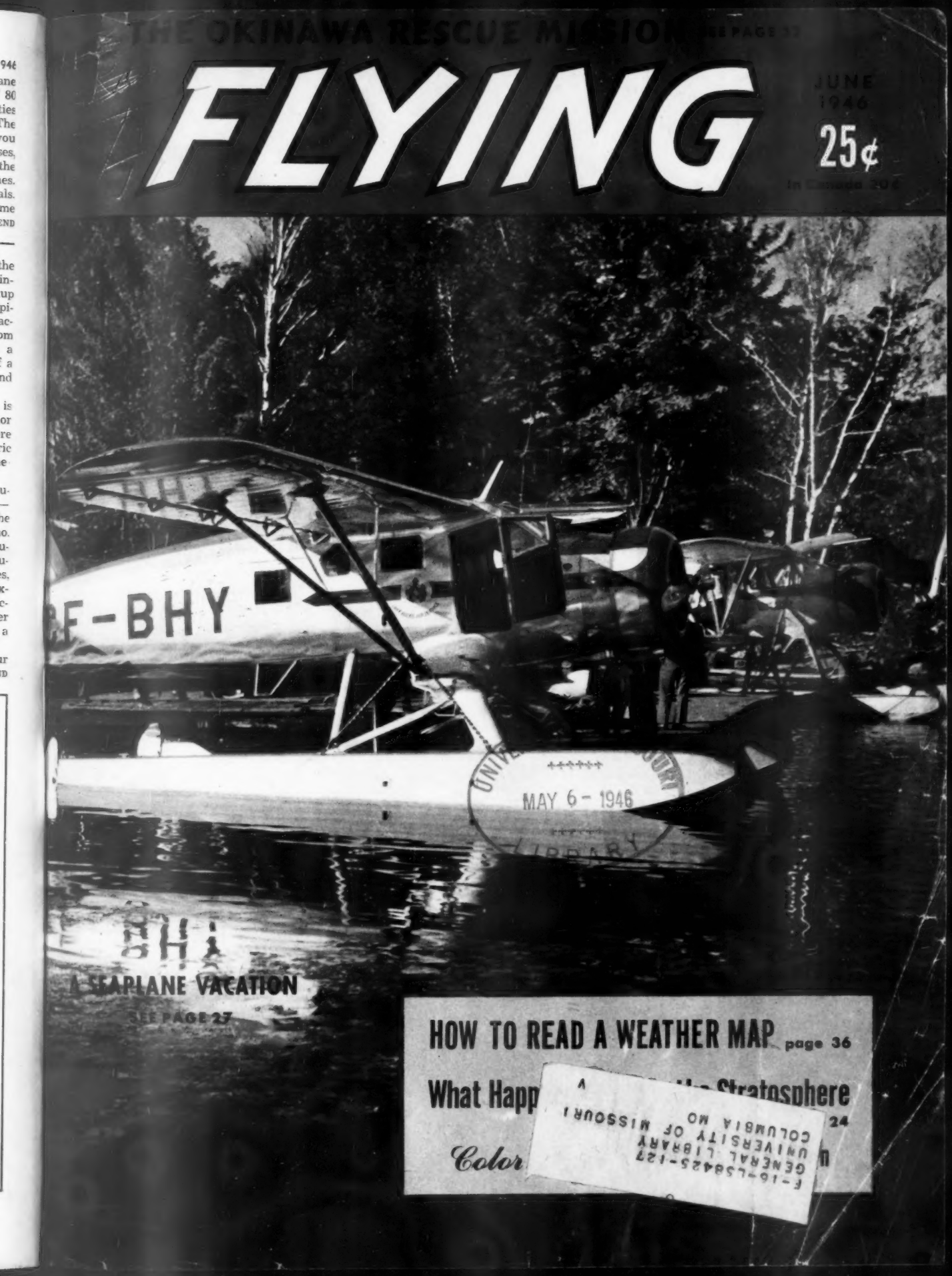
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Bags for gasoline make flying cheaper

TO EAT bullets and seal the bullet hole was the wartime purpose of rubber fuel cells. But during the war it was discovered that these cells also prevented the leakage-through-the-skin which often happened in metal gasoline compartments, sealed by riveted seams or other fastenings. This would mean savings of hours of maintenance for any airplane and is one of the things helping to make today's flying cost less.

So today's airplanes are profiting by this wartime lesson. B. F. Goodrich is making thin-walled rubber bags which line the fuel compartments to add a new factor of safety to private and commercial aircraft. In the picture, one of these new cells is being installed in a new Douglas airliner.

B. F. Goodrich has developed bladder cells covering weight and strength requirements for all types of airplanes. A paper-thin tank would be suitable for relatively small gas loads which would not be subject to much sloshing, while heavier tanks would be necessary for the larger volume loads. However, as loads increase, the relative weight of the tank decreases.

For better design, bladder cells should be designed into new ships, but it should not be assumed that the cells cannot be adapted to ships now flying. They *can*, and B. F. Goodrich engineers are eager to show you how. For further information, write to *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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JUNE • 1946

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THE COVER

These two seaplanes were photographed by Hans Groenhoff in Canada. They are two of the aircraft operated by the Gray Rocks Air Service. The plane in the foreground is a Canadian-built Noordwyn Norseman; that in the background is an American-built Waco. In Canada, the seaplane is considered to be as commonplace as the landplane is in this country. These airplanes stay on floats throughout the summer, changing to skis for all winter operations.

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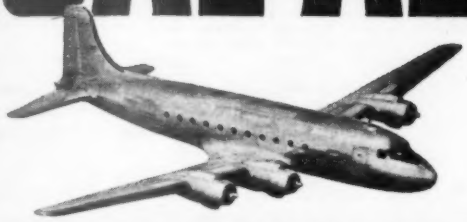

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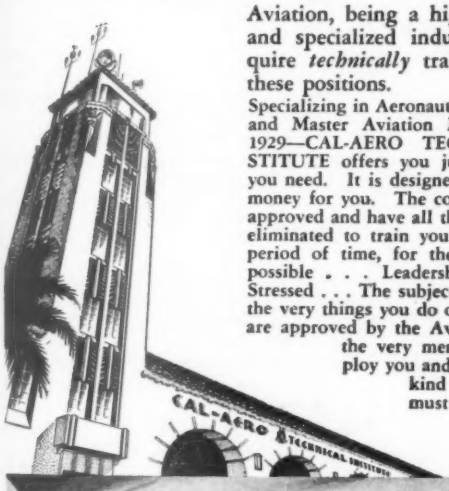

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HANGAR FLYING

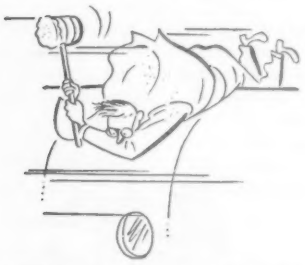
LOCKHEED

The Busted Window at 20,000

Kicking windows out of airliners isn't what you'd call approved airborne etiquette. But, not so long ago, Lockheed did just that during flight tests on the *Constellation's* Normalair cabin.

Back in the days when Wiley Post was making his pioneering swipes at the stratosphere, Lockheed engineers, of course, had learned a lot about supercharging cabins doing groundwork (and airwork) on the old Lockheed XC-35, the first plane with a fully pressurized cabin.

From the knowledge thus gained about stressing, sealing and supercharging, the research men then perfected the famous Normalair cabin. Now, while the *Constellation* sleeks along at 20,000 feet, the altitude inside the ship is a mere 8,000.



Lockheed insisted on knowing what would happen to people if pressure went down (which is unlikely, since either of two superchargers can carry the load). So one day, in a carefully planned experiment, they kicked out a window at 20,000, with 44 random-picked, ordinary people aboard. The pressure and the plane descended smoothly, and no serious discomfort turned up.

Q. E. D. If an unknown factor crops up at Lockheed, it doesn't stay unknown long. This kind of efficient curiosity makes for good planes and good hangar flying.

L to L for L

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Letters

Reader comments should be addressed to Letters Editor, FLYING, 185 N. Wabash Avenue, Chicago 1, Illinois. All letters should be signed. Names withheld upon request.

COLOR BLINDNESS

Is it possible for a color-blind person to learn to fly? Would he be permitted to fly alone?

Franklin, La. SIDNEY CARP

● Color perception has been waived as a requirement for private licenses but a partially color-blind pilot must demonstrate compensatory ability before he can obtain a commercial license. The commercial pilot must be able to distinguish colored signal lights and colors of terrain, especially in controlled traffic near an airport. The private pilot need only pass his flight test and physical.—ED.

POST-WAR PLANE AND SERVICE

After 15 years of piloting all types of planes, commercial and military, I believe my ideas on post-war private planes and service deserve a hearing.

Such planes should be two- and four-place for the average business man. They should be marketed as an economical means of transportation. The stock model two-place job should sell for $800 or, fully equipped with instruments, for $1,000—in the same price class as Ford, Chevrolet and Plymouth automobiles. The four-place plane should sell for about $1,600, fully equipped.

Both planes should have retractable, tricycle landing gear, 125-m.p.h. cruising speed, a 700-f.p.m. climb, and at least a five-hour cruising range at 60 per cent power. They should have folding wings so that storage costs could be cut to approximate what one must pay for the family car.

Service costs must be cut to a minimum and repair time must be reduced to not more than one to two days. An inspector should be available at all service repair stations so that owners may have planes relicensed without delay.

RONALD A. LEMON
Capt., A.C.

APO, N. Y.

● Reader LeMon's ideas undoubtedly will be realized—but not until plane production equals automobile production.—ED.

RITTER'S ANSWER

Several criticisms were leveled at my article, "I Learned About Flying from That," in the October, 1945, issue of FLYING.

At least one critical friend should reread it with care. He claims I shifted cockpits but he will find I never stated that I was in front. He failed to realize that the mirror used by the man in the front to see the man in the rear, can be used also by the person in the back cockpit to see the face of the student instructor. What's more, cockpits can be changed in mid-flight, though I don't advocate the procedure.

Then there was a group of acrobatic-minded Army pilots who claimed my stalled turn procedure would have produced a half snap, or a vertical reverse. I have never seen that violent gyration produced from a stalled turn by applying "full throttle, full opposite rudder, and snapping the stick forward." But I concede that if one held the controls in this position after recovery from the stalled turn, he could force his plane into an outside snap roll. If my critics fly in that manner, however, I suggest they return to Primary or Basic training and relearn how recoveries are correctly made from stalled turns.

The alternate stalled-turn recovery suggested by one writer [". . . apply throttle, shove the stick forward and complete the turn."] is very good when one has unlimited altitude—but not at 500 feet. It is a well known fact that a plane in a bank has a higher stalling speed, therefore more speed is required to recover. Less effective lift, slower recover, more altitude loss, and more dead pilots are the natural sequence of the suggested maneuver when it is used at low altitudes.

JAMES C. RITTER

Forest Hills, N. Y.

HARPOONED

In the picture section of the April issue, you identified the Lockheed P2V as the *Harpoon*. Isn't this the *Neptune*? The PV-2 is the *Harpoon*.

G. L. LESLIE

San Diego, Calif.

● Reader Leslie is correct, our expert stands harpooned by the Neptune.

FLIGHT INSTRUCTORS' BEEF

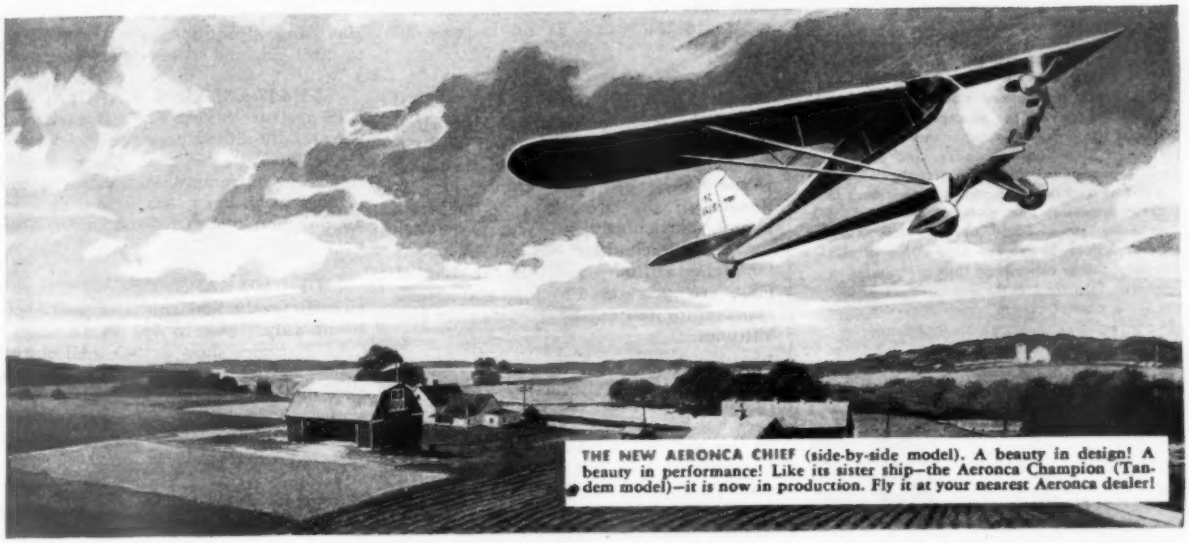
Flight instructors at various Army and Navy schools found themselves in the Air Corps Enlisted Reserve shortly after war broke out. Most of us had many hours of previous flight experience which we were told would be valuable to our country. Many had been turned down by the military because of slight physical deficiencies but were in good enough condition to teach. When flight schools were closed down, after a sufficient backlog of pilots was established, there was no further need for us.

Called to active duty, many of us have spent months doing practically nothing—with little or no chance to use our flying experience. Now that the war is over,

(*Continued on page* 88)

AERONCA'S FAST CLIMB

makes it ideal for small field users!



THE NEW AERONCA CHIEF (side-by-side model). A beauty in design! A beauty in performance! Like its sister ship—the Aeronca Champion (Tandem model)—it is now in production. Fly it at your nearest Aeronca dealer!

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FLY AERONCA—price it—compare it! See for yourself that the Aeronca Chief or Champion give you more value for your dollar than any other low-priced plane.

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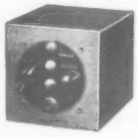
The "more" that you get in RANGER Aircraft Radio is well demonstrated by the Model 117 dry-battery powered superheterodyne receiver. For example, the "117" uses a coaxial lead-in cable that eliminates the pickup of ignition noises; and employs an antenna matching transformer at the point of lead-in that matches the antenna to the transmission line, giving a higher signal to noise ratio. *These developments have never before been used in a radio of this type.* Another advantage that contributes to *plus* performance, is the improved automatic volume control system which makes signals more readable and prevents reversal of "A" and "N" range signals due to blocking.

The RANGER Model 210 Transmitter matches the Model 117 in weight and size, yet puts out a *powerful* signal. Both the "117" and the "210" may be operated from a single battery pack.



RANGER VHF equipment will be ready when CAA VHF facilities are established. Authorities advise that present frequencies will be continued for several years after VHF ground equipment is installed.

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Have You Heard?

. . . ABOUT THE SEAPLANE BASE for private flyers in Manhattan recently opened by Dennis Caterine, a 25 year old veteran? He has a *Cub* on floats and 35,000 square feet of a ferry slip at Dyckman and 200th Streets on the Hudson River. Three to five lightplanes can be stored at present, and a hangar will be built soon. Flight fees are $8 solo and $11 dual per hour.

. . . THAT INSURANCE RATES for air passengers, flying anywhere on either scheduled or non-scheduled flights, have been reduced 17 per cent for each $1,000 of principal sum and 20 per cent for the first $100 of medical reimbursement? In addition, insurable pilots flying any non-commercial aircraft licensed by the CAB now may be protected on flights anywhere in the world at no increase in rates.

. . . THAT THE NATIONAL AERONAUTICS ASSOCIATION is protesting the present 250-foot maximum altitude for airplane speed trials under the rules of the *Federation Aeronautique Internationale* on the grounds that the new planes, particularly jet types, are designed to reach their greatest speeds at far higher altitudes and that the lives of pilots are endangered by flights at speeds approaching 600 m.p.h. at extremely low altitudes.

. . . THAT CLOSE CO-ORDINATION of research activities on development of personal aircraft has been agreed upon by the National Advisory Committee for Aeronautics and members of the Personal Aircraft Council of the Aircraft Industries Association? William T. Piper, council chairman, recently stated that more and more NACA facilities would be made available for civilian plane design and operation.

. . . THAT DURING THE WAR, 30 or 40 aeronautical engineers, plus about 400 draftsmen and mechanics, were all that were needed to design a plane? Now, just one company needs 500 scientists and aeronautical engineers for a single project. Of these, 75 to 100 must be physicists, chemists, and even astronomers—all experts in pure research.

. . OF THE REORGANIZED PACIFIC AIR LINES where all captains and first officers are former Naval Air Transport flyers and even the stewardesses are former Waves?

. . . OF A SUGGESTION by John Geisse, assistant to the administrator for Personal Flying Development, CAA, that manufacturers consider incorporating folding wings in their new personal planes? He predicted they would save airplane owners $150 or more a year in storage charges, increase the airport operator's income, cut the cost of hangar construction per plane, and increase the number of planes that can be accommodated at a small field.

. . . ABOUT THE "TWIRLY BIRDS," an organization of early helicopter pilots recently organized in New York? Qualifications are that "the applicant without assistance from other persons, shall have flown a helicopter in sustained flight prior to V-J day." It is estimated that approximately 300 persons in the United States, and 75 to 100 abroad, might meet these qualifications.

. . . THAT PLYWOOD PARTS of De Havilland *Mosquitos* have been adapted to meet England's beer-barrel shortage.

. . THAT ENGLISH MANUFACTURERS are turning out aircraft parts made of specially-milled paper and certain adhesives? Called Pytram, the material is said to be extremely light, can withstand tropical conditions, has a low cost production and resists fatigue under vibration.

. . OF THE RAPID GROWTH in civil aircraft production rate last year—from 10 in July, 1945, to 797 in December? CAA statistics show a 1945 total of 2,047 planes. If the industry is to turn out its goal of 30,000 planes in 1946, a report states, it would require an average monthly output of 2,500 planes, based on reported orders on hand for 50,000 planes.

. . THAT IT WAS DECIDED at an international meeting in Montreal to base the World Aeronautical Charts on the standard American one-to-a-million scale? A few changes will be made: green will be used to show wooded areas on European charts; green will continue to show land areas close to sea level on most charts of this hemisphere. Airmarked towns will be underlined with magenta; markers outside of town limits will be indicated by an "M" in the square.

. . ABOUT THE PRE-COOKED "FROZEN MEALS" served to Pan American passengers? Maxson Food Systems provide the full-course meals, including apple pie, each on its individual plate, and special ovens aboard the *Constellations* make them piping-hot in 15 minutes.

. . THAT IN WYOMING they're counting antelope from the air? Two planes are used—a *Cub* and a Cessna—and the game warden claims this method of taking an antelope census is far superior to the old methods of foot, truck and estimate.

THE AIR WEAPONS OF TODAY ARE FORGED IN LABORATORIES.

THE AAF's WAR OF RESEARCH

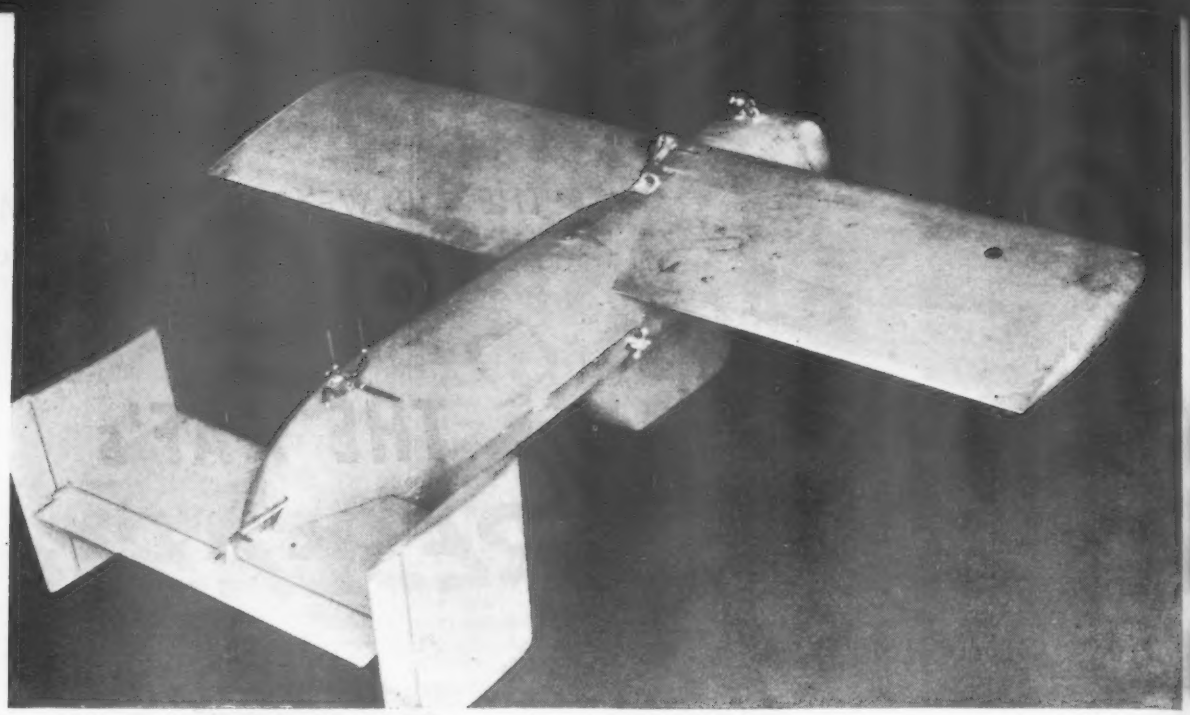
By Maj. Gen. CURTIS E. LeMAY

Deputy Chief of Air Staff for Research and Development.

THE development and employment of the atomic bomb was the greatest event of 1945—and of World War II. Whether it or the devastating attack on the Japanese home islands by our combined air and Naval forces brought about the surrender of Japan is a question history will long consider and may never answer. In the popular mind, however, the explosion of the atomic bomb remains the cause of Japan's surrender, since it was the culminating attack of the war.

But the atomic bomb—for all its significance as spectacular fact and its threat and promise to the future—is merely the greatest technological achievement of our own or other nations, during or before the war. To appreciate in proper perspective the technological innovations of World War II and the program for technological research and development in the future it is best to forget the atomic bomb altogether—at least temporarily.

A single atomic bomb may well be used to start and win a future war but the real significance of the atomic bomb lies in



Controllable glide bomb (GB-4) is one of complex weapons developed during latter part of the war. It carries a television transmitter in its nose and is remotely guided into the target by controller in the "mother plane" which follows it on a televised screen.

its use in future wars and not in the war we have just won.

We could have achieved victory in World War II without the atomic bomb, and the atomic bomb, coming as it did so late in the war, could not alone have won the war for us. Indeed, had not other technological developments saved us from early defeat and made possible our great offensives and victories, we might not have enjoyed the freedom of time and resources necessary for the harnessing of atomic energy. The truth is that the United States was lagging dangerously in technological research and development at the beginning of the war and that we overcame our initial disadvantage only because of the tremendous incentive of military necessity. How necessary we found it to overcome our disadvantages is underscored by General Marshall's estimate: "To technological warfare we devoted 98 per cent of our entire effort."

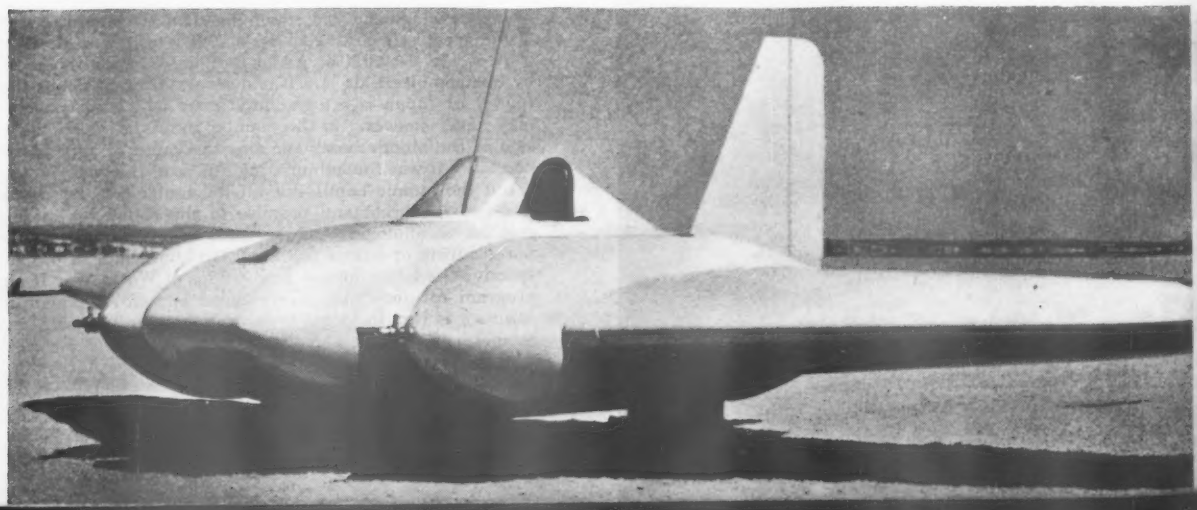
It is a matter of general knowledge now that during the years of so-called peace between World Wars I and II, Germany, Italy and Japan all built up enormous war machines, including large and fully equipped air forces. These countries had trained pilots and had tested their new weapons in actual wars, in Spain, in Ethiopia, and in China. Technological development, especially in Germany, had produced equipment and techniques that astonished the world and that, except for certain imponderables, might well have won the war for the country in which the discoveries and development had been made.

At Freeman Field, Ind., many tons of German aircraft and aircraft equipment have been assembled and similar Japanese material is en route. At Wright Field, O., German scientists are now assisting American scientists in translating great masses of captured German scientific documents. These documents reveal, as the materiel at Freeman Field indicates, the extent to which German science had out-distanced American science in basic and applied scientific research and in aircraft development.

It has been estimated that the Germans were 10 to 15 years ahead of us in fundamental research and as much as one to five years ahead of us in research on and application of certain principles such as turbojet and rocket power. This fact, if it had been revealed in 1941, might well have terrified the stoutest heart, the firmest believer in America's potential might.

Rocket research, for example, seriously begun in Germany in the early 1920s, was naturally well advanced. But it was neither time, accident, nor superior German inventive genius that gave Germany what technological advantage she enjoyed throughout the war. In Germany the (*Continued on page 70*)

Northrop-designed JB-1 was an experimental glider with extremely low tricycle gear. Apparently it was designed as a forerunner for a radical new jet-propelled flying wing fighter. Cylinders on wings appear to be dummy jet intakes. Only two were constructed.



Take-off of a ground-launched JB-2 buzz bomb is assisted by a rocket-powered sled for the first few seconds of bomb's flight.

Launching sled drops to ground once its rocket charge is exhausted. Bomb's jet motor now provides propulsion for flight.

U. S. BUZZ BOMB

Mobile trailer ramp was developed by AAF researchers for U. S. version of German V-1. Four rockets in rear of buzz bomb catapult it off the trailer sled and give it initial impetus needed before impulse duct engine can take over and start operating on its own.

Fairchild 24 (above), says author, is an excellent plane type for Latin America's long distances. Rio de Janeiro (below) as seen from air.

TIPS ON

IF YOU have an airplane handy and are seized with the urge to fly to one of those romantic South American places you've been saving for a vacation goal since before the war—hold everything!

As a civilian in line of duty, I was lucky enough to do a lot of that kind of flying in South America during the war and I can truly testify that it's great sport. But don't listen to anybody who tells you you can ferry even a brand-new lightplane down there without difficulty. It just isn't being done. Something new must be added to what you do and what you customarily take on a routine U. S. flight—if you expect to get yourself and plane back home in one piece.

My experience grew out of an assignment I got as a flight and training consultant for the CAA. In the summer of 1942 I was sent to Argentina, where I was stationed for a year and a half, followed by my present assignment as a CAA flight and training consultant with Brazil. During this time I have flown more than 2,000 hours in South America in everything from Douglas DC-3s to DHs. From that experience, my advice would be to have a long look at everything before you so much as gas up and when you do gas up be sure to use a chamois.

Take a look at the plane, for instance. We might just as well get the bad news over with first—if you are going any distance, don't go in a lightplane. Mexico—mebbe—but even then you will be taking chances. Your plane should have a minimum cruising speed of 100-110 m.p.h., five hours of gas, preferably two engines and should be in absolutely tip-top shape. You come down in an emergency in some of the jungle country of Mexico, parts of Central America or in the Amazon area, and

TOURING South America

By C. J. TIPPETT

Senior Aviation Training Supervisor of CAA Assigned to Brazil

you're in plenty of trouble. Even 30 miles from a settlement is like being 500 miles from one in normal northern woodlands. Moral: Take a plane in which the chances of your making a forced landing are next to non-existent. (If you're interested in a specific model, I made my first flight to Argentina in a Fairchild—10,300 miles, 113 flying hours and 44 stops—and my most recent one in a Beechcraft *Expeditor*—Rio to Miami in 30 hours—both swell for the purpose.)

Be sure to take a light but all-emergency tool kit. To get supplies to you in a majority of South American spots would take months. At the very minimum, you should have a screw driver, pliers, safety wire, spark plugs, an all-duty wrench and whatever spare parts you can carry without overloading.

In case of real trouble, you should also have along a pretty thorough shirt-sleeve mechanical knowledge of what makes a plane tick and the courage to improvise if necessary. The South Americans can inspire you in this department—I have seen *Cubs* on remote fields with bicycle wheels. I saw another landing gear that had been made of jungle wood based on a picture of the plane in FLYING magazine. Carburetors made of old tin cans are commonplace. In short, you may have to improvise.

Once you are underway, use more precautions than in the U. S. to check your plane before take-off. Always drain your gas and sumps and clean your strainers at each stop. After all, before a guy at a jungle field makes a new undercarriage out of bicycle wheels, he might be tempted to appropriate yours. If he doesn't—most South Americans are friendly and honest—one of his cows or something a bit wilder might wander over during the night and horn a hole in a wing or chew one in the fuselage. Whenever possible, spend a few pesetas to have a native sleep under your plane, or tie it close to the airline building if there's one on the field. Lock the plane!

Having taken a look at the aircraft, let's take a look at you. (You may not recognize yourself after your first night in the open without netting and insect repellent; I didn't.) If you're planning to come home happy and whole, be sure to go down prepared to live in a totally different civilization, not infrequently wilderness, and one in which most of the natives at interior fields are used to diseases which will knock you for a loop.

I don't mean to scare you off—remember, my premise is that you're going to enjoy your trip—but I do want to caution you against ruining your fun by neglecting a few commonplace precautions.

Take a carefully stocked medical kit. By this I'm not referring to anything particularly fancy in the way of drugs—indeed, you'll be surprised at some of the items I consider a necessity. An eye dropper is one. It's invaluable because, when you want to put a drop of iodine on a small cut, you put a drop, period—instead of wasting half the bottle. All cuts should be so treated immediately. South of the border, if you don't, nine times out of 10 you wind up with an infection.

Another thing that makes the eye-dropper handy is for taking care of your eyes. Here again, if you get foreign matter under your lids and don't clean it out quickly, an infection may result. Both of these minor precautions may save you many weeks of mental harassment or worse. (*Continued on page* 102)

The NAVY'S AIR RESERVE

Reserve pilots will fly eight hours monthly in current combat types.

By FRANCES HANSFORD

Washington Office of FLYING

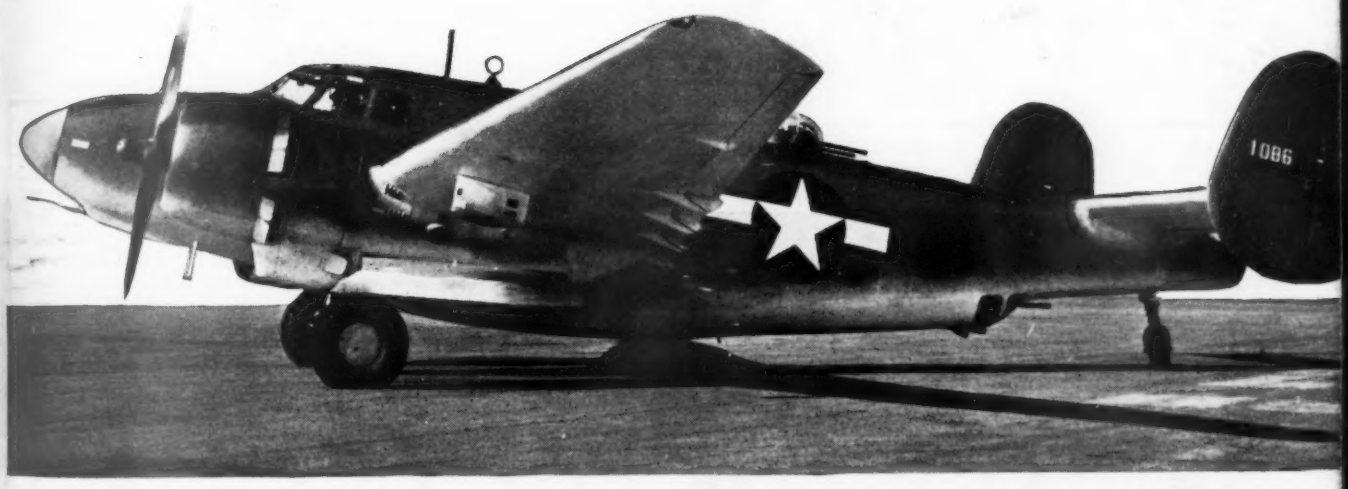
The Navy's war-trained personnel will be kept at peak proficiency under the new Air Reserve plan.

THE Navy does not intend to let its hot pilots cool off. Thousands of pilots and other Naval air personnel will be enlisted in a comprehensive part-time program to preserve their flying skills. In a national emergency, a small part of this reserve could be assigned to immediate combat duty while the rest would go into combat as soon as the ships of the Reserve and Inactive Fleets could be adequately equipped and made ready to sail.

The Air Reserve will be composed of two main groups—28,700 Naval and Marine personnel in a Ready Reserve, and larger numbers in a Standby Reserve. Personnel of both groups will be trained to fly the latest types of combat aircraft and be kept abreast of the ever-changing developments in tactics.

Navy requests for appropriations were passed by the Bureau

Martin Mauler, a dive-torpedo bomber, is one of the new-type planes which Naval Reservists will fly. It has 350-m.p.h.-plus speed, uses intermeshing dive brakes.



Lockheed Harpoon, a new long-range patrol bomber, also will be flown by reservists.

of the Budget and have been discussed in the appropriations committees of both houses of Congress. By the time this appears, the matter should have been brought to vote.

Meanwhile, Vice Adm. Arthur W. Radford, USN, Deputy Chief of Naval Operations for Air, has announced plans in advance of Congressional approval so that "the men now separated from the Navy who want to fly in the Reserve will have an idea of what to expect and make their civilian plans in accordance with the opportunities offered."

The Air Reserve will be one of four functions under the naval air training program of the Regular Navy. Admiral Radford has appointed Rear Adm. D. M. McQuiston, USNR, as his special assistant and representative in all matters pertaining to the Air Reserve program. The chief of the Naval Air Reserve program will be a regular Naval officer, at present Rear Adm. Edward C. Ewen, USN. When the commanding officer of the station is a regular Naval officer, his executive officer will be a reserve and vice-versa. A large portion of his staff will be reserve officers. The program is being planned by reserves on active duty under the supervision of regular Navy officers and once in effect will be run by reserves in close co-operation with operations of the regular Navy.

Until the permanent Air Reserve can be activated, an interim program has been put into operation until July 1, 1946. Under the Naval Reserve Act funds are available for the operation of airplanes and any separated Naval aviator on inactive duty may go to the nearest Air Reserve Station and fly six hours per month. No pay is received for flying time during this interim period. On July 1, 1946, the permanent program takes the place of the interim training sequence. (*Continued on page* 80)

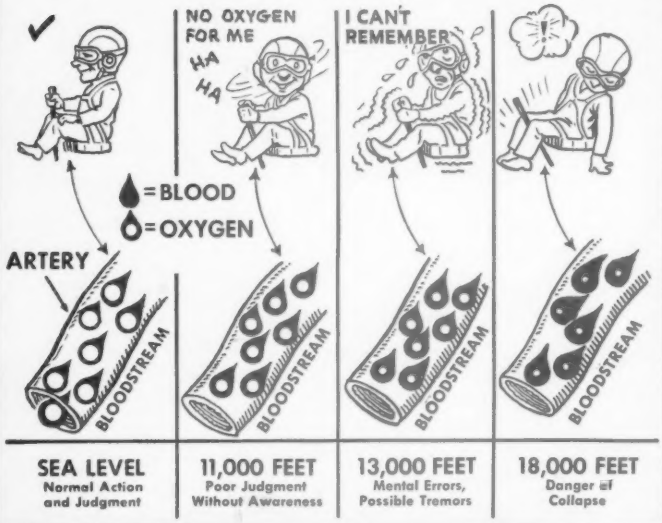
MAN IN THE

MAN is a surface creature. He is made for near-sea level air atmospheric pressures and air rich in oxygen. When airplanes lift him into the stratosphere he meets strange new problems. There is not enough oxygen to keep him alive. Reduced pressures do strange things to his body.

1. OXYGEN MEANS LIFE

The body gets oxygen by breathing. In the lungs, oxygen is pushed into the blood which carries it to all parts of the body. There it burns food to produce energy. Oxygen makes up about a fifth of the air at any altitude but where the air is too thin, man cannot live.

ALTITUDE REDUCES OXYGEN IN THE BLOODSTREAM



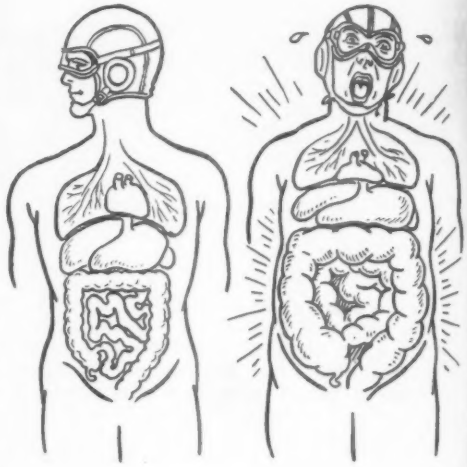
SEA LEVEL	11,000 FEET	13,000 FEET	18,000 FEET
Normal Action and Judgment	Poor Judgment Without Awareness	Mental Errors, Possible Tremors	Danger of Collapse

2. BREATHING PURE OXYGEN

Through his mask, the pilot breathes pure oxygen and escapes, for a time, the hazards of the thin air. But oxygen masks are only practicable up to about 40,000 feet. Above that height, surrounding air pressures are no longer sufficient to drive enough 100% oxygen into the blood stream.

3. GAS EXPANDS AT ALTITUDE

It expands inside the body just as air does outside. The result is extreme discomfort—sometimes unconsciousness. Pilots are warned not to eat gas-producing foods. Dry gas expands to five times its sea level volume at 39,000 feet, and if water is present it may expand its volume as much as eight times.



SEA LEVEL

Gas pressure in alimentary canal is same as sea level pressure outside the body —14.7 pounds per sq. in.

39,000 FEET

Outside pressure is less than three pounds per sq. in. and internal gas must also expand accordingly.

STRATOSPHERE

4. THE BENDS

At reduced pressures, dissolved nitrogen is released from blood and forms painful gas bubbles similar to those deep sea divers experience.

6. COLD

Over 40,000 feet air temperature averages 67° below zero. Clothing must be warm, dry, not too bulky. Electrically-heated suits are sometimes worn. Pilots are warned never to take their gloves off aloft.

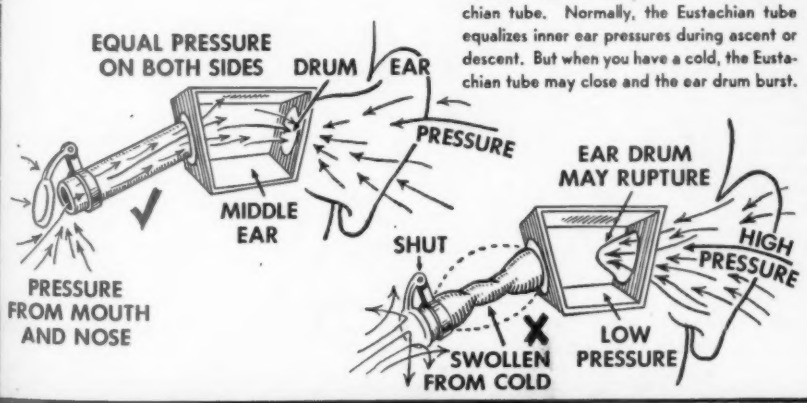
MT. McKINLEY
20,300 feet

CIRRO-STRATUS

CIRRO-CUMULUS

5. EAR PRESSURE

The middle ear is an air-filled "box" behind the ear drum. Its only outlet is the Eustachian tube. Normally, the Eustachian tube equalizes inner ear pressures during ascent or descent. But when you have a cold, the Eustachian tube may close and the ear drum burst.



ALTITUDE	TEMPERATURE FAHRENHEIT	PRESSURE LBS. LBS. PER SQ. IN.	
65,000′		.825	
60,000′		1.04	
55,000′		1.32	
50,000′		1.68	STRATOSPHERE
45,000′		2.14	
40,000′		2.72	
35,332′	−67.0°	3.40	TROPOPAUSE
35,000′	−65.8°	3.46	
30,000′	−48.0°	4.36	TROPOSPHERE
25,000′	-30.15°	5.45	
22,000′	−19.5°	6.20	
20,000′	−12.3°	6.75	
15,000′	5.51°	8.29	
12,000′	16.2°	9.35	ALTO-CUMULUS
10,000′	23.34°	10.11	
5,000′	41.2°	12.23	CUMULO-NIMBUS
3,000′	48.3°	13.17	NIMBO-STRATUS
SEA LEVEL	59.0°	14.70	

Temperature varies with Tropopause which varies with Latitude.

NEW CODE FOR PRIVATE PLANES

Radically new CAB plane specifications call for aircraft to be stressed for specific uses.

AN APOLOGY

After detailed investigation, FLYING'S *editors have found that Grover Loening's report to NACA on private flying developments (cited in "Any Hope for the Private Plane?" in the April issue) did recommend extended research to improve private flying. The report stated that, in general, lightplane manufacturers expressed great interest in research and outlined many problems on which NACA could be of assistance.*

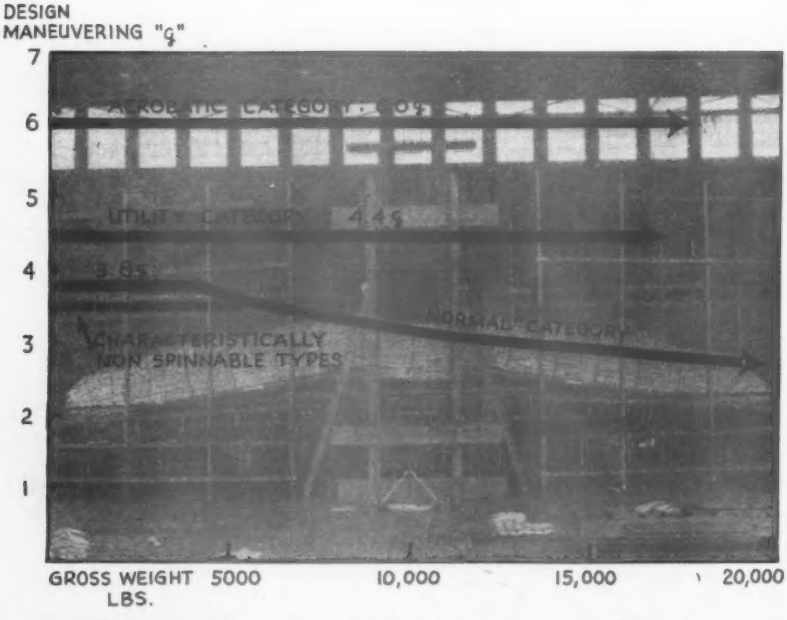
Any statements to the effect that Mr. Loening reported lack of research interest on the part of lightplane manufacturers were incorrect, though obtained from official and usually reliable sources.

We regret any injustice which may have been done to Mr. Loening, whose activities for the advancement of private flying have always been of the highest value to the industry.

The following article illustrates this spirit of co-operation between Government and industry. NACA findings formed part of the basis for the development of the new codes outlined here.

ONE of the most foresighted aviation moves of recent years was the issuance by the Civil Aeronautics Board of a special airworthiness code for the design of private planes. Its unwieldy title—Civil Air Regulations, Part 03, "Airplane Airworthiness; Normal, Utility, Acrobatic and Restricted Purpose Categories"—should not camouflage its importance.

Behind that imposing title are mandatory details of airplane design that will affect the private pilot and the non-scheduled operator when they buy and when they fly. The new rules also have a bearing on post-war designs now coming off the drawing boards, and they directly affect all planes that will be built after the close of this year.



Strengths required by new code are illustrated in chart. Acrobatic planes of any weight need 6.0G, utility types need 4.4G, non-spinnable types' strength depends on gross weight.

Generally speaking, the new regulations are compulsory for all new airplane types licensed after January 1, 1947. However, progressive manufacturers who are anxious to cash in on the advantages of the new rules may comply with them now. This means that many of the personal planes built before the end of the year will be issued an Approved Type Certificate as dictated by CAR 03.

The whole business boils down to the fact that, like the military, civilian purchasers now will buy planes designed, built and licensed for a specified use. Ever since the day our armed forces first took to the air, the Army and Navy have varied airworthiness specifications to accord with the maneuvers expected from their fighters, bombers, trainers and other fixed types. Similarly, the new requirements enable civilian pilots to select personal planes from one or more of standard performance categories—normal, utility or acrobatic.

This system will guarantee that each plane licensed will be suitable for any type of flying within the overall limitations of its category. Pilots familiar with these limitations will know immediately what to expect of their plane without reference to some long-lost handbook.

Licensing of these airplanes will follow the usual procedure. All planes, regardless of category, will carry the familiar "NC" number. Racing planes, and others with restricted use, will be licensed in the "restricted purpose" category and will still bear the "NR" designation.

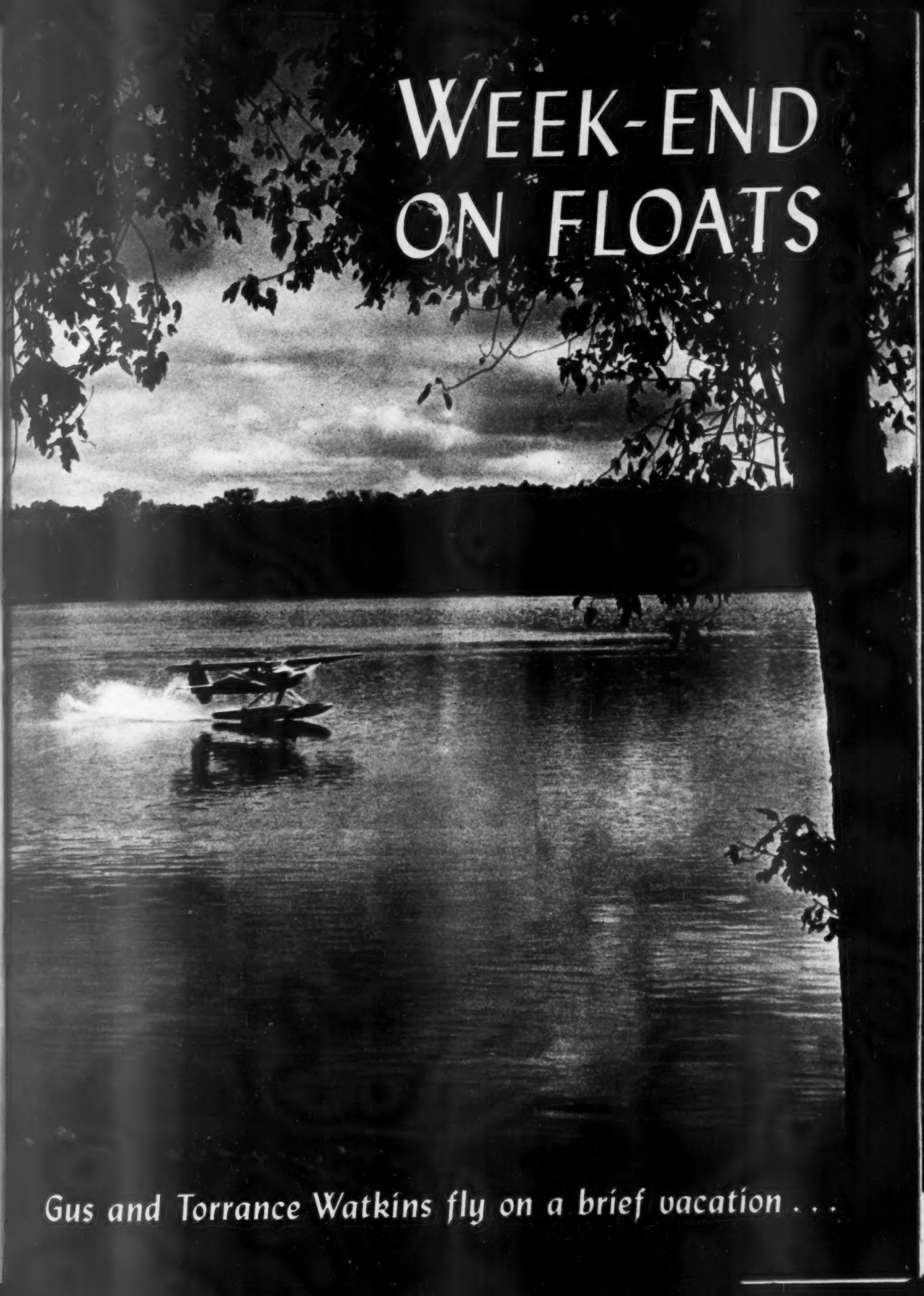
NC planes in the standard categories will be designed to fixed maneuvering limitations and structures will be beefed up to withstand a specified maneuvering "G" (weight factors exerted upon a moving body are measured in terms of the earth's attraction upon that body—i.e., one "G" is equivalent to the weight of the body at rest.—ED.). On this basis normal category airplanes will be limited to straight flying. No acrobatics will be permitted, not even spins. Utility planes will be built so that some acrobatic maneuvers can be performed. Those in the acrobatic category, as the term implies, will be checked out for all maneuvers.

Flight tests will be made to prove that a plane meets requirements for a particular category. Inherent stability, control and normal flight characteristics will be tested in the air. Even normal category planes which are not to be spun intentionally must show that they can be pulled out of a one-turn spin in 1½ additional turns. Acrobatic planes must recover in four turns after a full six-turn spin. Utility planes must comply with either the normal or the acrobatic spin test at the discretion of the manufacturer. If a utility plane is not to be intentionally spun, it must meet only the normal category requirements and be placarded against spins. If spinning is to be permitted on utility planes, they will be flight tested in the same manner as acrobatic types.

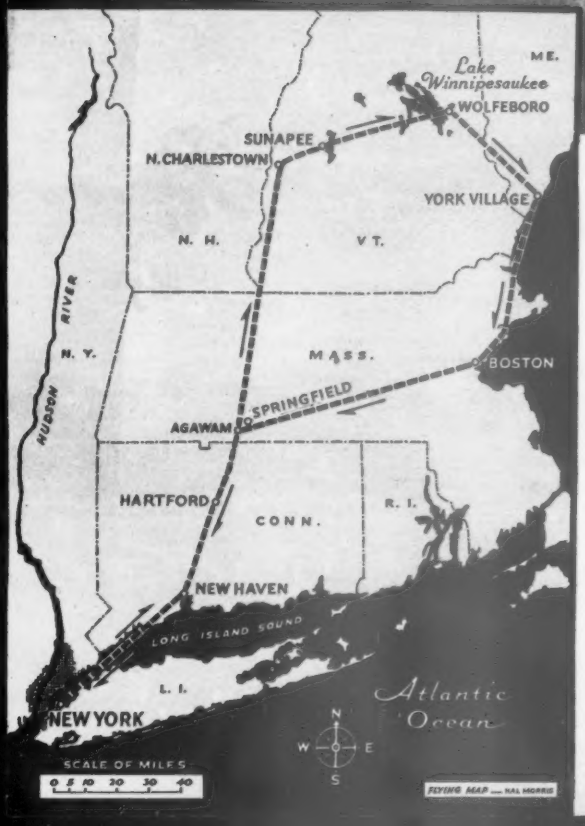
These flight requirements (plus stand-

(*Continued on page* 92)

WEEK-END ON FLOATS



Gus and Torrance Watkins fly on a brief vacation . . .



New England-bound for a three-day aerial holiday of hunting and fishing, Gus Watkins and his wife have readied their plane and outlined a route shown on map at left. Gus cranks the propeller from behind while Torrance handles switch.

PRIVATE plane owners are just a few hours from almost any vacation spot. To Capt. August Dorr Watkins, 31-year old contract pilot for American Overseas Airlines, this is not just theory. Captain Watkins regularly flies *Skymasters* across the North Atlantic and is able to spend only about three days a week at his home in Brookville, L. I. Three days isn't long for a real holiday and Captain Watkins and his wife, Torrance, dearly love hunting and fishing. Their solution was obvious—a flying weekend in New England.

One week-end last fall the Watkinses arranged for the care of their two young sons and rented a 1940 Luscombe seaplane which had already logged over 5,000 hours. They took off from LaGuardia Field Marine Basin for a Friday-to-Sunday hunting and fishing week-end over the route outlined on the map at left.

Captain Watkins and his wife left New York Friday

Following Connecticut River after crossing Long Island Sound, the Luscombe's next stop is Agawam base near Springfield.

Over Memorial Bridge, Springfield, after refueling at Agawam, the Watkinses head for Lake Sunapee, 105 miles away.

Lake Sunapee landing, after 2½ hours in the air and 225 miles of flight. Same trip by auto takes more than five hours.

Mooring seaplane with help of Elmore Sheffield (holding wing), at Sunapee Harbor. Sheffield owns Yverdun House where the Watkinses stayed overnight. Because of late season, seaplane attracted unusual attention.

Refueling at Lake Sunapee. The 105-mile trip from Springfield, Mass., consumed a little over five gallons of gasoline.

Exploring Lake Sunapee before dinner, the Watkinses reconnoitered the 33 miles of shore line in less than half an hour.

LOG OF A FLYING WEEK-END

ROUTE	AIR MILEAGE	FLYING TIME	GALLONS FUEL CONSUMED	FUEL COST
New York-Springfield	120	1 hr. 20 min.	6.5	$ 1.95
Springfield-Sunapee, N.H.	105	1 hr. 10 min.	5.7	1.71
Sunapee-Wolfeboro, N.H.	45	30 min.	2.5	.75
Wolfeboro-Boston	100	1 hr. 10 min.	5.7	1.71
Boston-Springfield	85	1 hr. 00 min.	4.9	1.47
Springfield-New York	120	1 hr. 30 min.	7.4	2.22
Sightseeing, etc.	...	3 hr. 00 min.	14.7	4.41
Totals	575	9 hr. 40 min.	47.4	$14.22

morning, with a FLYING photographer trailing after them in another Luscombe to take pictures. First stop was Agawam Land and Seaplane Base at Springfield, Mass., where the plane was gassed and the Watkinses had lunch. In 40 minutes they were off for Lake Sunapee, N. H., their first scheduled overnight stop.

The air mileage to Sunapee is approximately 225 miles (compared with 292 miles by road). Averaging 90 m.p.h. point-to-point, the airplane could have made the trip nonstop in 2½ hours. It would have taken at least five hours of hard driving by automobile. Allowing a stop for gas and food at Springfield, and deducting daylight time for the late start, the Watkinses arrived at Lake Sunapee early enough to gas their plane and make a sightseeing flight around the lake before dinner. Mr. and Mrs. Elmore Sheffield, owners of Yverdun House at Sunapee Harbor, pro-

Next morning, Gus looks at oil gauge and checks plane for an early start, while Torrance sponges out float compartments.

Heading for Wolfeboro on Lake Winnipesaukee. Most of the trip is over lake-studded country. Ragged Mountain ahead.

Flight to Wolfeboro from Sunapee Harbor is made over beautiful wilderness. New England's lake-studded terrain is a paradise for seaplanes.

Bow of Edo float cuts across small islands of Lake Winnipesaukee as the plane nears Wolfeboro for afternoon of hunting.

Lunch in a quiet cove on Lake Winnipesaukee. Gus and Torrance eat hurriedly because they don't want to miss hunting date.

Afternoon hunting over, Gus and Torrance are met by Conservation Officer Willard Stockbridge who checks day's bag.

Fog delays take-off the next morning, but the two flyers lay out their course, then decide to kill some time fishing.

vided a pleasant lakeside room and home-cooked meals at $5 per day.

The flight to Wolfeboro, N. H., on Lake Winnipesaukee, 45 miles away by air, was made early Saturday morning and took 30 minutes from take-off until the plane grounded its floats on the ramp at the Lakes Region Land and Seaplane Base.

At Winnipesaukee, the Watkinses made sightseeing trips, took friends for rides, landed at a secluded island for a picnic lunch, and still kept their hunting date in the afternoon. Mr. and Mrs. Ralph G. Carpenter II were hosts, providing hunting dogs and ground transportation.

On Sunday, fog interfered with flying plans so the Watkinses spent the morning leisurely, fished, then took off for

Fly-fishing, after taxiing across the big lake, proves none too fruitful but it is fun while it lasts. The fog is beginning to lift.

After fog disperses, Luscombe takes off from Lake Winnipesaukee and heads on course down the Maine coast to Boston.

Boston Harbor. Gus ties up at Jeffries Yacht Club float when he discovered that pre-war seaplane facilities had not been reinstalled at Logan Airport. After refueling and lunch, Gus and Torrance took off for LaGuardia Field.

Boston in the afternoon. Their route passed over the southernmost tip of Maine, along the Atlantic Coast to Boston, then cross-country to Springfield, Mass., the longest non-stop overland flight—about 100 miles. During the entire trip the Watkinses were within sight of lakes or rivers suitable for a landing at all times, except on the last 30-mile stretch between Boston and Springfield. After refueling at Springfield, the Luscombe followed the Connecticut River route to New Haven, then flew diagonally across Long Island Sound back to New York.

The chart on page 30 shows mileages, flying time, and fuel costs. Airplane rental is not included. Mileage total does not include approximately three hours of flying on sightseeing trips and giving short rides to friends. END

Report from Washington

By FRED HAMLIN

ONE of the major miracles of the war—application of television to aerial combat—recently got public attention under Navy-RCA auspices and astonished everybody who saw it demonstrated. Wartime uses of television had been under heavy security blankets until the recent show. It is almost impossible to put on paper how faultless and effective television is under simulated combat conditions. It's like a movie—but from real life. By using radio you can warn a pilot that there is an enemy plane on his tail and then watch him shoot the attacker down in flames.

Now that the war's over, David Sarnoff of RCA predicts a hatful of peacetime applications. One he suggests is its use in test flights of new supersonic-speed aircraft. The trick would be to replace test pilots with remote-control apparatus, including television, and then sit in your office, fly the plane, and get a moving-picture close-up of the instrument board. But don't expect in the near future the ultimate miracle—licking the landing problem with television equipment. It needs a lot of light, and therefore is useless in dirty weather or at night. Could be they'll work out something in combination with radar to solve the problem but that's in the more distant future.

Wartime Applications

In case you don't already know, airborne television played a number of important wartime roles. One of the many miracles it performed was as "eyes" in guiding remote-controlled air and surface craft, such as pilotless bombers and crash boats loaded with high explosives bound for enemy targets. Other uses included observing gunfire, artillery spotting, gun control, reconnaissance aid in making amphibious landings, and map-making. Television also aided in guiding explosive-filled gliders by remote control, as well as free-falling, radio-controlled aerial bombs, flying torpedoes, and assault drones.

The airborne equipment has been known as the "Ring" and "Block" projects. Ring units transmit high-quality television up to 200 miles. A Ring unit has two special radio-electronic cameras, one of which can be operated with the freedom of a newsreel camera. It can flash battle action back to headquarters, picking up the moving scene or fixing on one point. One camera is in the nose of the plane, the other in the fuselage. The pilot can switch from one to the other without blacking out the screen, and can fix on any desired target.

Block television is a lighter, short-range type, operating from 15 to 20 miles. There is only one camera, in the plane's nose. It first saw action at Bougainville and Rabaul. One of its outstanding characteristics is its lightness. Efficient as it is, working without being jammed by the vibration of the plane, the entire airborne unit weighs only 50 pounds.

Board Blitz

Look for an accelerated speed-up in Civil Aeronautics Board airline route decisions, especially concerning franchises for feeder and international routes. Board members are particularly concerned with getting U. S. foreign routes in operation as quickly as possible to meet competition of airlines from other nations. One area that will receive particular attention is the east—from Hawaii on out, where no transports are operating under Federal franchises today.

Hope is to have the foreign route problems pretty much settled by the end of the year, but not so with feeders. There are a total of 650 feeder applications on file at the Board today and it is going to be a colossal task to award contracts.

Non-scheduled operators are becoming more concerned daily over the difficulties they have encountered in sitting down on fields where operations are in charge of a scheduled operator. Particular difficulties have been experienced at fields of this type in foreign areas. Whereas in the old days everybody helped everybody else, the non-scheduled boys complain that now the big operators are giving the little independents poor service or none at all. These conditions may be a deciding factor in bringing non-scheduled operations under regulatory control of the Board, where co-operative action is said to be encouraged. Regulations for non-scheduled operations may be forthcoming before summer's end.

GI Joe College

Returned veterans interested in getting some book learning in the aviation field may have come to the conclusion that they might as well have stayed in uniform if it was red tape they were trying to get away from. We've done some scouting around on this ourselves and until recently have hesitated to put anything on paper, the confusion being what it was. But now we are able to report a few facts that are definite and may be helpful.

In the first place, pin this in your hat: If you want to get Government assistance for either on-the-job or school training, go to the nearest veterans organization or the nearest Veterans Administration office and fill out Veterans Administration Form No. 1950.

Form No. 1950 is called "Application for Training Benefits" and after you've filled it out, mail it to the Veterans Administration office in the state where you live. *Don't* send it to Washington. If you do, they'll eventually get around to referring it back to your state office, causing delay, or it'll get lost in the shuffle. In from one to four weeks, if you are lucky, VA will send you a "Certificate of Eligibility," showing the amount of training to which you are entitled. This you take to your prospective employer or school.

One other suggestion: In picking your employer or school, check with both VA and CAA to find out if they are okay for the kind of education you are seeking. It might help when you come to exams, if any. Having done all these things, and assuming that school or employer forwards *his* necessary papers to the proper officials, your first subsistence check should come along in from three to seven weeks and regularly thereafter.

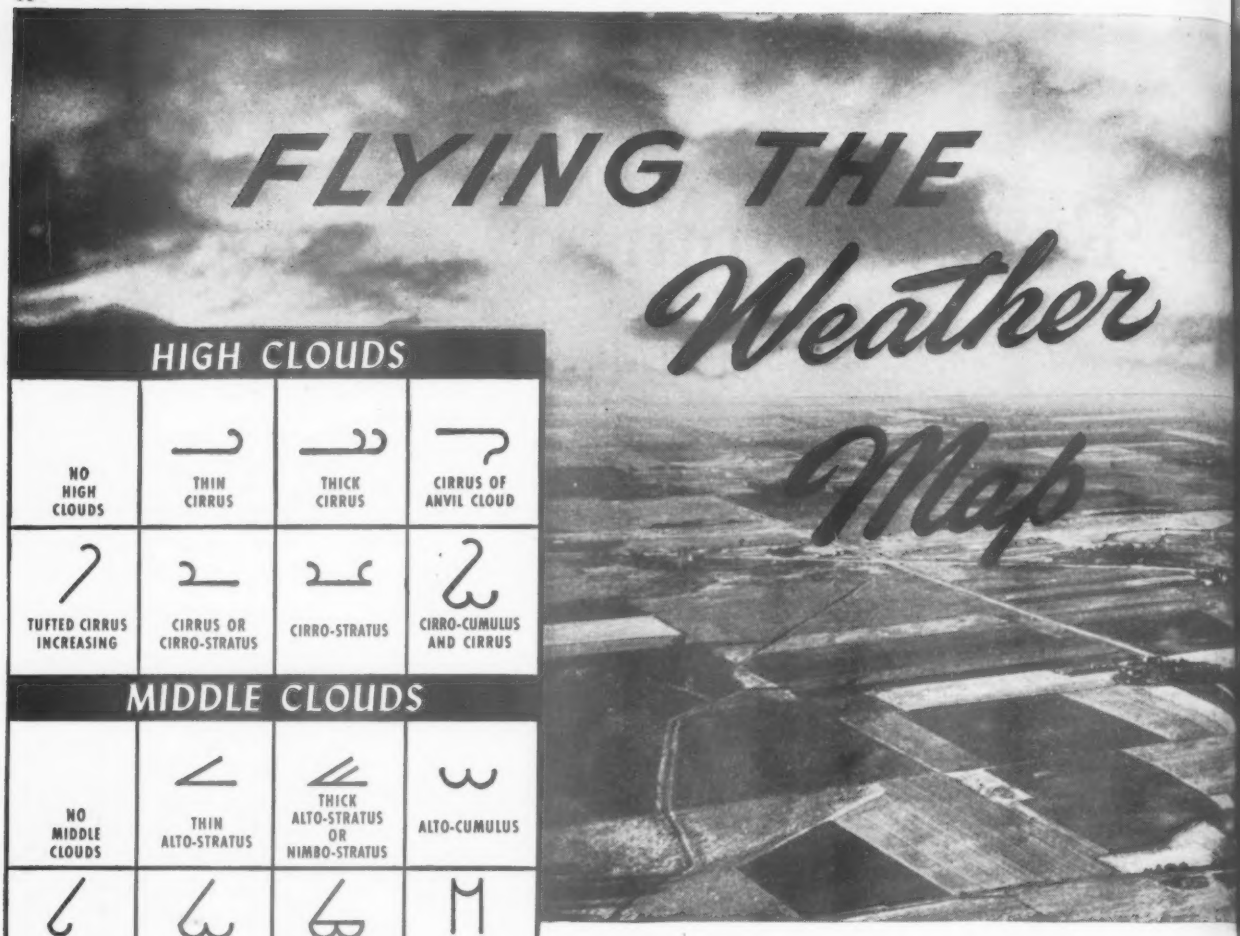
Mechanics

VA reports a brisk interest in straight lightplane flying courses. Most enthusiastic are older GIs who already are qualified for some kind of work, feel they are too old to go back to school and don't see why they shouldn't learn to fly so long as it's free.

A more bread-and-butter interest is indicated in those seeking civilian aircraft and engine licenses. This is one of the best fields in which a man can work at an aircraft job, at the same time studying on the side. He may be paid both for the job and for his studies. With VA approval, you get wages from the company, plus $65 Federal subsistence if

(*Continued on page* 96)

FLYING THE Weather Map



HIGH CLOUDS

NO HIGH CLOUDS	THIN CIRRUS	THICK CIRRUS	CIRRUS OF ANVIL CLOUD
TUFTED CIRRUS INCREASING	CIRRUS OR CIRRO-STRATUS	CIRRO-STRATUS	CIRRO-CUMULUS AND CIRRUS

MIDDLE CLOUDS

NO MIDDLE CLOUDS	THIN ALTO-STRATUS	THICK ALTO-STRATUS OR NIMBO-STRATUS	ALTO-CUMULUS
ALTO-CUMULUS IN SMALL PATCHES	ALTO-CUMULUS IN BANDS	ALTO-CUMULUS WITH ALTO-STRATUS	ALTO-CUMULUS IN TUFTS

LOW CLOUDS

NO LOWER CLOUDS	CUMULUS OR FAIR WEATHER	SWELLING CUMULUS	CUMULO-NIMBUS
CUMULUS FLATTENED TO STRATO-CUMULUS	STRATUS OR STRATO-CUMULUS	LOW BROKEN CLOUDS OF BAD WEATHER	ARROW ON ANY CLOUD SYMBOL SHOWS DIRECTION OF MOTION

CLOUD COVER

NO CLOUDS	ONE-TENTH	TWO OR THREE-TENTHS	FOUR FIVE OR SIX-TENTHS
SEVEN OR EIGHT-TENTHS	NINE TENTHS	COMPLETELY COVERED	SKY OBSCURED

*Do you know how to read a weather map? It is essential to safe flying.**

THE weather station at the airport isn't that mumbo-jumbo house of mystery with secret symbols and practically non-understandable codes and maps. No, the symbols are actually simple, and the maps, with a little study, are not much more difficult than the kind the gasoline station gives the cross-country motorist.

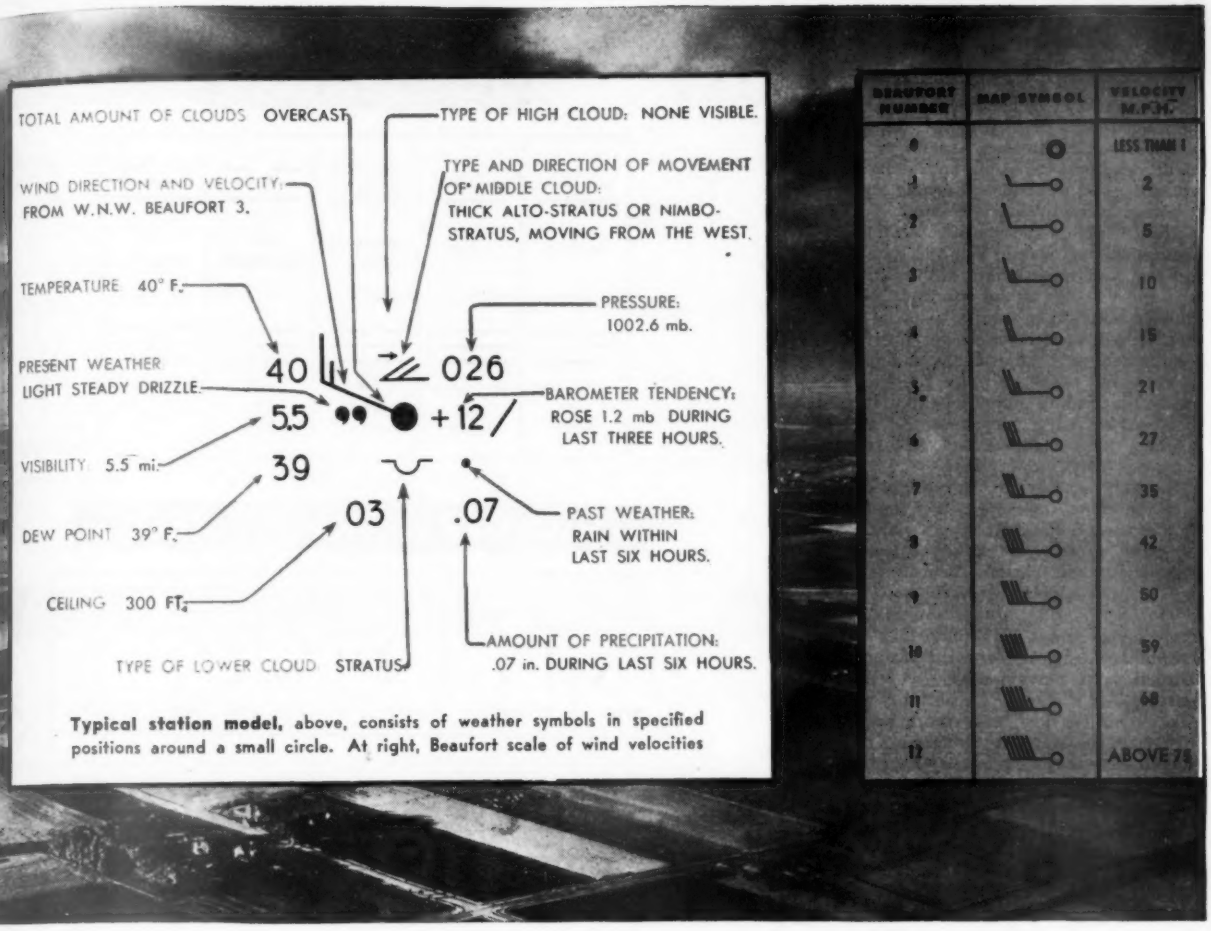
And the weather station is important. Information coming over its teletype or given out by the weather man (aerologist) often means the difference between a swift, fast flight and a bumpy, erratic journey might be cut short by lack of fuel.

In planning any flight, you need specific information about the weather at your take-off point, at your destination and on the intervening route. You also want information about the weather off your course, in case it should be necessary to alter your flight plan for any reason.

It isn't enough to know what the weather is now at your destination. You want to know what the weather is going to be when you get there. Likewise, the current status of the weather at your base isn't enough. You must know what the weather is going to be when you get back.

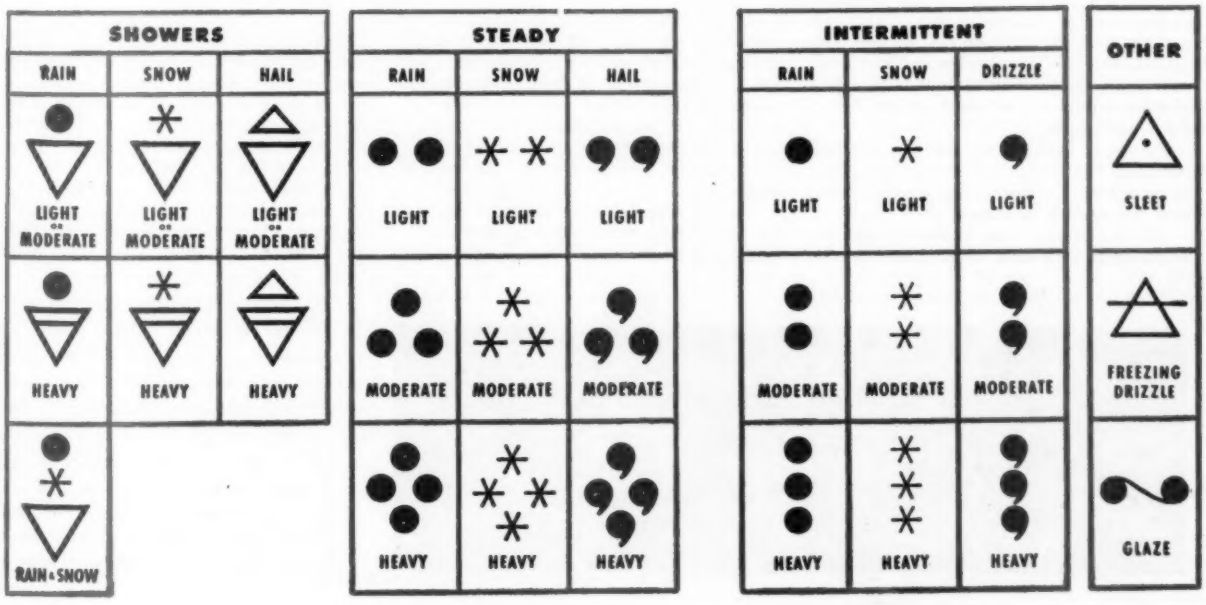
In a sense, you must forecast. By reviewing what the weather

**This is a condensation of the Navy booklet entitled "Flying the Weather Map," prepared by the Training Division, Bureau of Aeronautics. It is No. 8 in the Navy's aerology series, reprinted here because of its brief, simple, lucid treatment of weather and its relationship to all types of aviation.*



Typical station model, above, consists of weather symbols in specified positions around a small circle. At right, Beaufort scale of wind velocities

PRECIPITATION



is like now, and what it has been in the past, you will have to figure out what it's going to be in the future, when it will become most important to you.

This is quite a problem, but it is one you won't have to work out alone. The aerologist will help you by giving you the weather information at your own station, at your destination, and along your route as well as at any alternate airports where you might decide to land.

Now, what is the specific weather information you should know?

First, you want to know the direction and the velocity of the wind. It will influence your flight from take-off to landing. It will have its effect on your E.T.A. (estimated time of arrival) and it may increase or decrease your range materially, depending upon whether it is a head or tail wind. In any event, it will affect your navigation and will require accurate drift computations.

Second, you want to know about clouds —the amount, their type, and the direction of their movement. From your study of cloud types you already know how significant their various forms can be to a pilot: that altostratus means good cover and smooth flying; that cumulus over a front means rough going, and that cumulonimbus means danger with a capital D. Direction of movement is no less important, for it shows you not only where the clouds lie now, but where they are likely to be later on. Once you are in the air they may help or they may hinder you.

You need to know about ceiling and visibility—the distance you can see aloft from all angles—straight ahead or either side and below. (Always bear in mind that the ceiling for a particular airport is the actual number of feet between the field and the cloud base—a ceiling of 1,000 feet is actually 1,000 feet above the airport, no matter what the altitude of the field above sea level may be.) You also want to know the amount and nature of precipitation, for this can be an obstruction to vision.

You need to know the temperature. It has its effect on operating conditions, of course, and in addition it may warn you against icing or indicate to you the passage of a front. In relation to dew point, the temperature tells you whether you should expect fog at your station or at your destination.

Pressure and barometer tendency—whether rising or falling—are important to you because they indicate the speed and movements of fronts.

All in all, you want to know what the weather is now and what it has been—what's been going on for the past six hours—so that you can figure out what may happen next at your base and at other nearby stations.

There are many things a pilot can tell about the weather simply by visual observation, as a sailor can tell the state of the wind and sea by "seaman's eye."

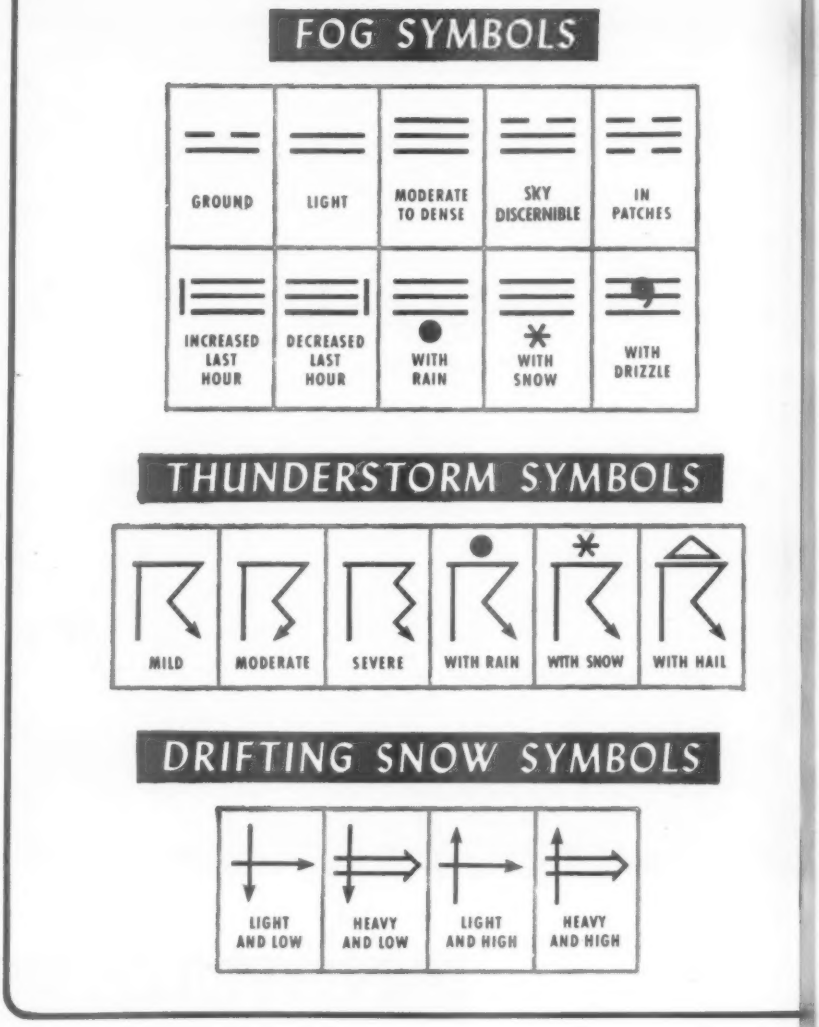
Smoke, tree branches, wind socks, and weather vanes show wind direction.

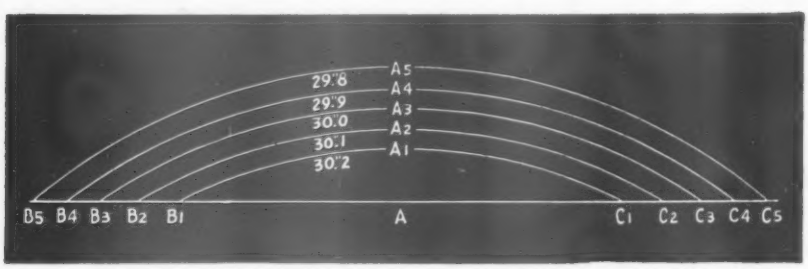
Ceiling and visibility can be estimated approximately by sight from the ground.

Cloud types and direction of movement can be recognized by sight.

But these are not all the weather factors, and in order to get a true picture the pilot must supplement what he sees with accurate information.

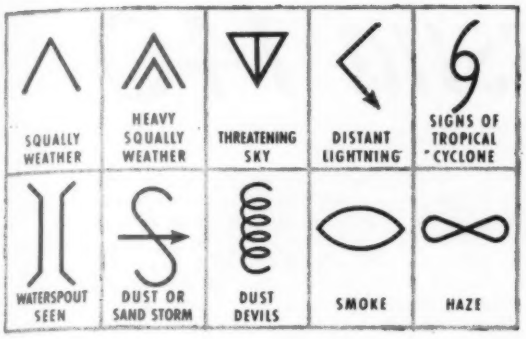
Weather information is collected and exchanged among thousands of weather stations all over the world. You want the information about your own station



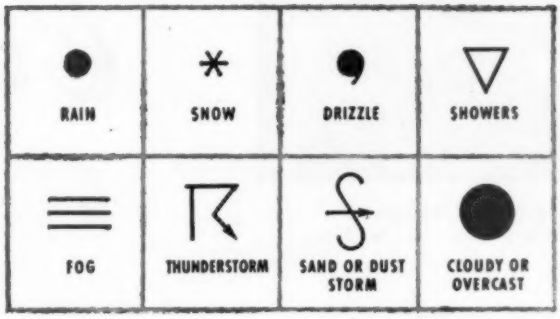


Correct altimeter setting before your take-off or you may intersect the ground with unfortunate results. A plane taking off from A would have correct altitudes indicated on its altimeter at A1, A2, etc., but in flying an isobar toward B or C it would intersect the ground at B1, C1, etc., as indicated on chart. Remember: "When flying toward low pressure you are lower than your altimeter indicates."

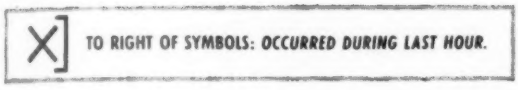
MISCELLANEOUS SYMBOLS

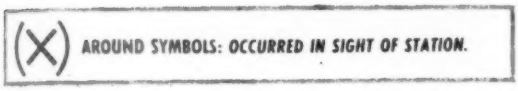


PAST WEATHER

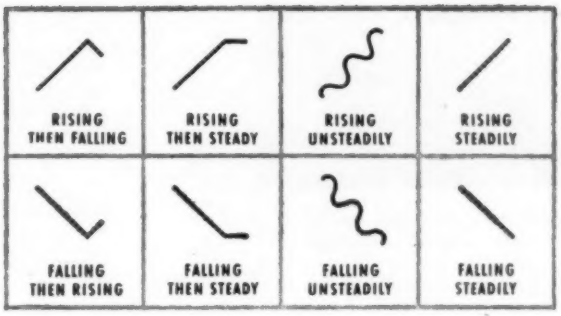


MODIFYING SYMBOLS





BAROMETER CHARACTERISTIC



and those nearby but, even so, the information must be accurate and the facts that must be exchanged between stations are so voluminous that the weather men have evolved a "shorthand system" or code. With it they pass the word to one another.

This system of symbols is used in transmitting or receiving weather information on the teletype. It is important for you to learn these symbols so that when you step into any weather office you can read the weather for any station which has filed its teletype report.

The teletype symbols follow an established pattern and once you have learned this pattern you will have little difficulty in decoding this esperanto which is used by aerologists. You can count on getting the teletype reports at any Navy, Army or Department of Commerce airport in the United States, and along the airways of Canada.

You will find the reports on the file boards in the weather office and as soon as you know how to make their seeming gibberish make sense they'll be very helpful to you.

The teletype system is changed from time to time but you can count on this much:

Each line represents the hourly report of some airport weather station.

The first group of letters (two or three letters in each case) identifies the reporting station. A list of call letters usually is posted in the weather office.

If the reporting station is the control station for a locality: the next letter will be C, N, or X. C means that contact conditions prevail at the airport. N indicates instrument conditions, i.e., you can't take off or land without permission except in case of emergency. X signifies that the airport is closed to all aerial traffic.

The next figure indicates the height of the ceiling in hundreds of feet.

Then follows a series of figures and symbols showing the state of the sky.

Next comes visibility, or how far you can distinguish objects horizontally.

Then state of the weather, shown by one or two code letters, modified by plus and minus signs.

Obstructions to vision are the next item, shown by one or two code letters with plus or minus signs, meaning dense (+) or light (−).

The next three items are always figures, separated by slant lines. The first shows barometric pressure in millibars and tenths of millibars but, to save space, only the last three numbers are shown. The second shows temperature in Fahrenheit, and the third shows dew point in Fahrenheit.

Wind direction and velocity are shown by a combination of arrow symbols and numbers representing miles per hour. Plus and minus signs are used to show strong gusts or light gusts.

Altimeter setting is indicated by three figures, the last three numbers of the

(*Continued on page* 84)

Engine cowl can be opened without tools, can be removed without removing propeller.

A single bolt holds each steel landing gear leg in place on Cessna's fuselage.

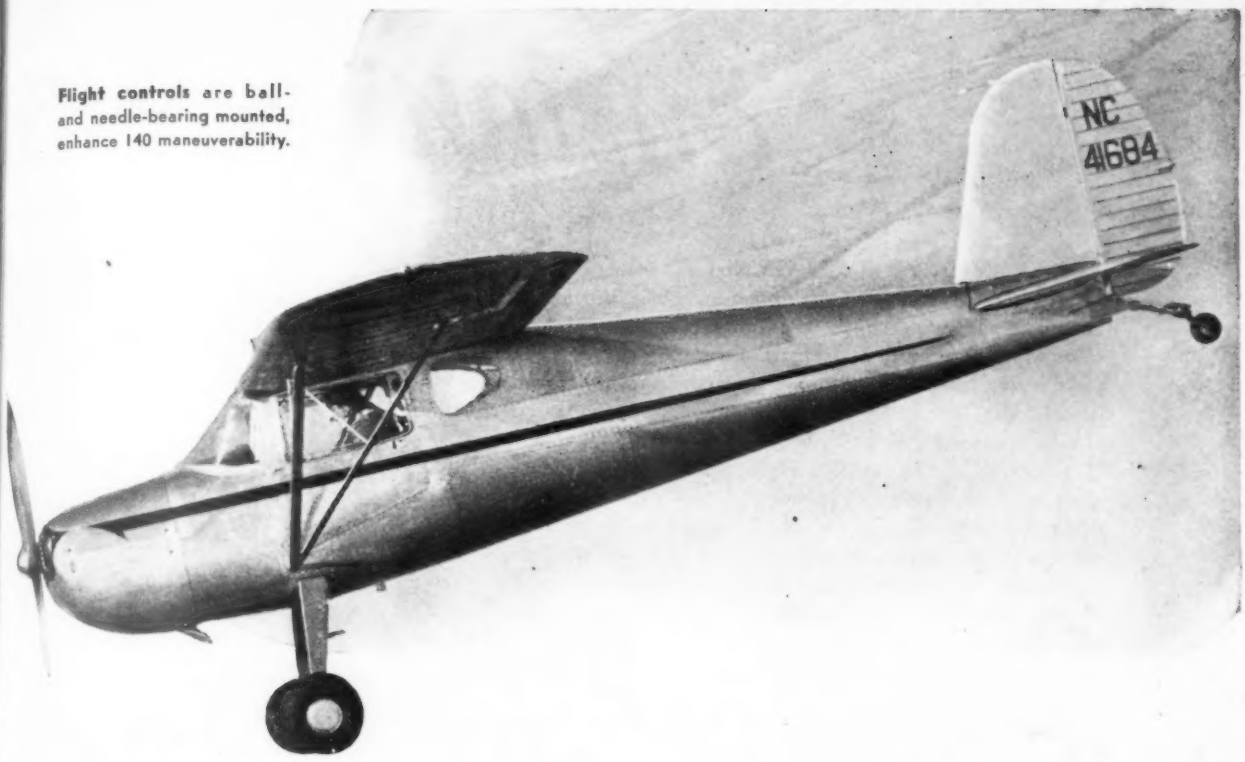
THE *Cessna 140*

CESSNA has visions of cornering the lightplane market with this deluxe lightplane and its stripped-down trainer counterpart, the 120. If the Wichita manufacturer is able to produce, distribute and service these two models on the large-scale basis it now plans, the 140 and 120 will be a good deal better known in aviation than are a number of famous old lightplanes currently on the market.

The 140 and 120 are basically the same airplane. The 120 ($2,495 f.o.b. Wichita) is $500 cheaper than the 140 ($2,995 f.o.b. Wichita). It does not have the flap, starter, generator, deluxe cabin, soundproofing or "extra" instruments of the 140, so it should be a good, economical "airport" plane, although it has the same gross-weight performance of the 140 and could be used for cross-country work if necessary. Because it is lighter than the 140 (770 pounds empty as compared with the 140's 890 pounds), it can carry a greater payload.

Both airplanes are all-metal except for the fabric-covered wings. Both are powered with the 85-h.p. Continental and both feature the novel spring-steel, one-piece landing gear legs patented by S. J. Wittman, famed racing pilot of Oshkosh, Wis. The new Cessna 170 and 190, which are new all-metal developments of the pre-war fabric-covered *Airmaster*, also will feature this new landing gear. The 170 and 190 differ only in their engines; one model will be powered with a Warner engine, the other with a Jacobs. (*Continued on page* 90)

All metal except for fabric over metal wing structure, this 140 differs externally from its trainer counterpart, the 120, only in its flap. Windshield and cabin windows are made of Plexiglas, giving improved visibility.



Flight controls are ball- and needle-bearing mounted, enhance 140 maneuverability.

EDITOR'S NOTE

This is the second article in a series designed to help the pilot and prospective airplane owner evaluate aircraft now on the market. The airplane manufacturer usually supplies the plane to be tested, but has no control over the opinions arrived at or published here. Readers are encouraged to comment on this new feature.

FLYING's TEST PILOT

Cabin appointments of 140 are attractive. Since this picture was taken, control wheels have been reversed, with rims hanging down. Rudder pedals and toe brakes are combined. Seat back hinges forward to permit stowing luggage.

THE ALL AMERICAN *Ensign*

ALL AMERICAN AIRCRAFT's bid for its share of the personal-plane market is this new experimental lightplane that features safety, performance and flying comfort. The *Ensign* is an all-metal, low-wing monoplane with a two-control system. Limiting the travel of the elevator helps make it spin- and stall-proof. Tricycle landing gear, differential hydraulic brakes and a 360° range of vision afforded by an unusually large bubble canopy are among its other safety features.

Powered by an 85-h.p. Continental engine, the *Ensign* is expected to have speed in excess of 120 m.p.h., a cruising speed of 110 m.p.h. Fuel consumption approximates 22 miles per gallon, which gives it a range of better than 400 miles with a useful load of 550 pounds.

Manufacturer's estimates place the price of the *Ensign* at approximately $3,000. Sales will be handled through dealerships in assigned territories. In addition to sales and complete service, each dealer will offer a complete stock of replacement parts, aiming to place maintenance of the plane on the cost level of the family car.

The 1946 production program calls for manufacture of 1,000 *Ensigns*. A later model will have a 125-h.p. engine and retractable gear.

THE ENSIGN IS DESIGNED FOR CROSS-COUNTRY TOURING

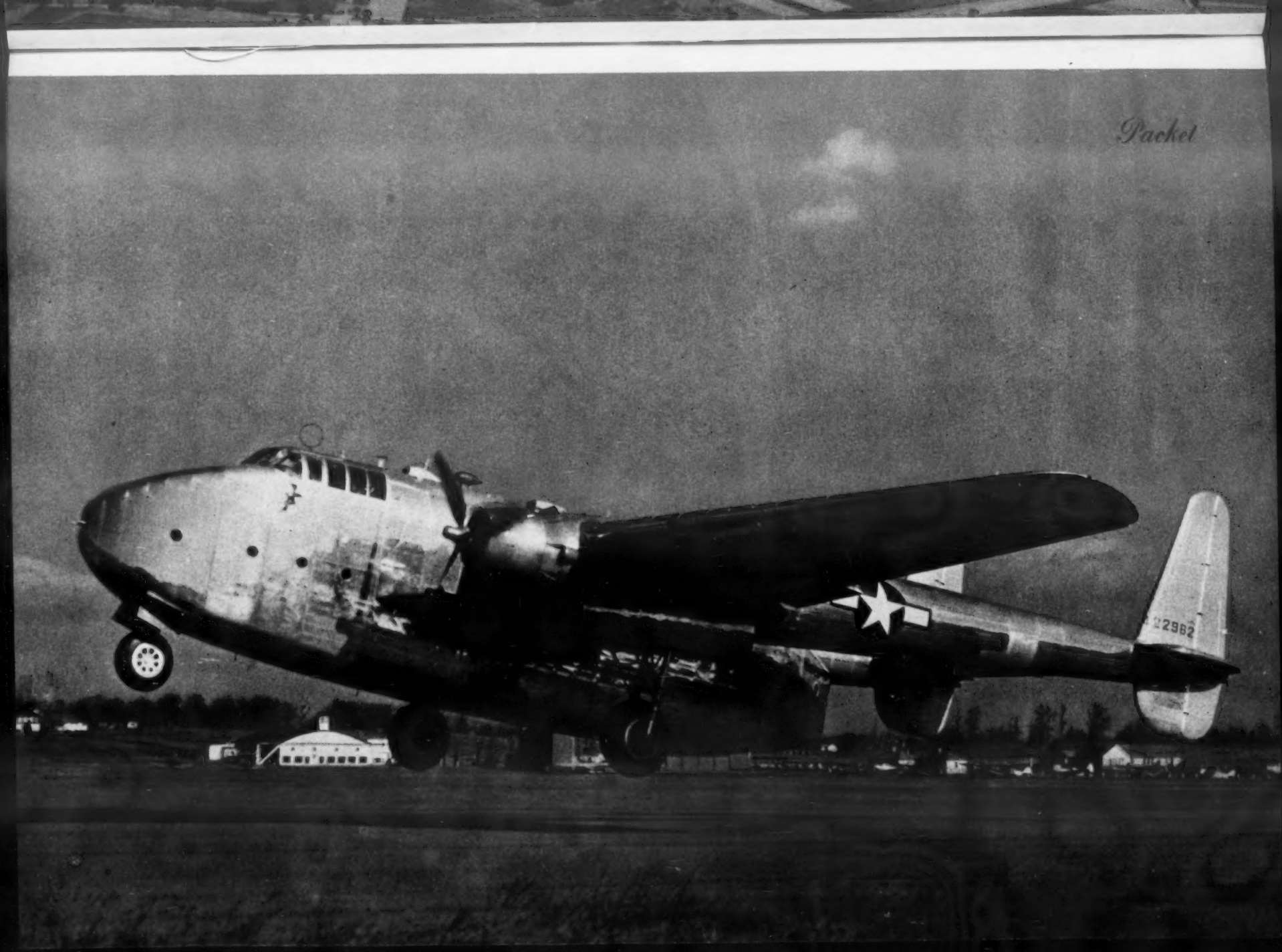
FLYING PHOTOGRAPH

the Month's Best

Aeronca Trio

10. ...LAND, BRITISH GIANT WAS 10,000 HORSEPOWER, CAN CARRY 70 PASSENGERS

Funk Bee


Packet

Seabee.

The Case for the PUSHER

By

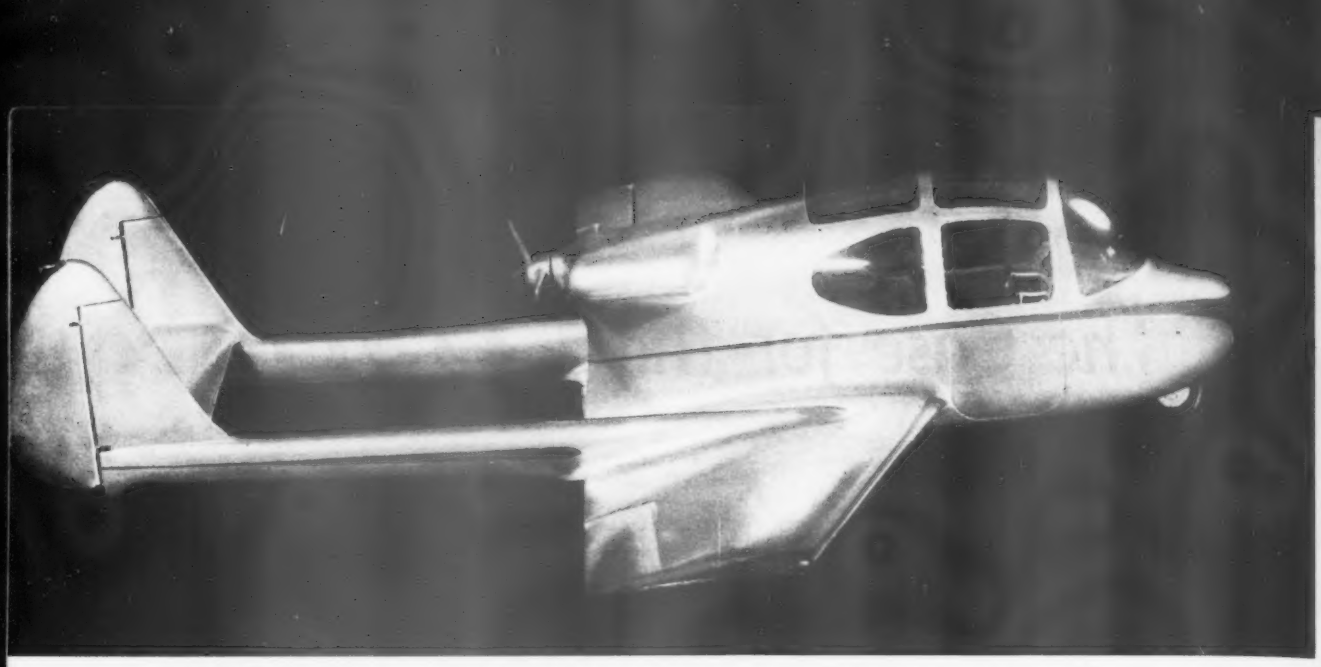
H. R. FOOTTIT

Chief Structures Engineer,
Ryan Aeronautical Company.

APPROXIMATELY 35,000 lightplanes are coming off the lines in 1946. Most of them are conventional, tractor-propeller monoplanes. But despite this rush to meet immediate production demands for conventional planes, there are some manufacturers who are working their experimental staffs overtime on development of the now almost forgotten pusher plane. Actually, not since the days of the Wright brothers have so many manhours been spent on pusher design.

The case for the pusher can be fiercely debated. However, with sound engineering design, it is safe to predict that its

Coaxial pusher props of the XB-42, driven by engines in fuselage, help to cut drag 20 per cent by eliminating nacelles and aiding smoother airflow.



Model of Skycraft, which is soon to be marketed by Skylark Manufacturing Company, illustrates how twin-tail-booms and the pusher design reduce propeller hazards while plane is on ground. Skylark will build both two- and four-place versions of this model.

good features will far outweigh the bad, and that it will become as popular in the next few years as the braced, high-wing monoplane was in the pre-war era. In brief, development of new pusher-type planes is worth investigation.

At present, the greatest stumbling block to ready adoption of pusher planes is the theory that public opinion will not tolerate anything new or different. If any group can be blamed for this attitude, it is the Army and Navy. Military aviation, unfortunately, sets the style and, once military style is established, public opinion slowly but surely accepts it.

Until recently, the Army and Navy have steadfastly refused to have much to do with the pusher. Consequently the design has held to a snail's pace in commercial development. Commercial manufacturers are slow to experiment, since research costs must be passed on to the airplane buyer. Such costs often mean fewer planes at a fixed price—a dangerous situation for the manufacturer when he is under the pressure of price-cutting competition.

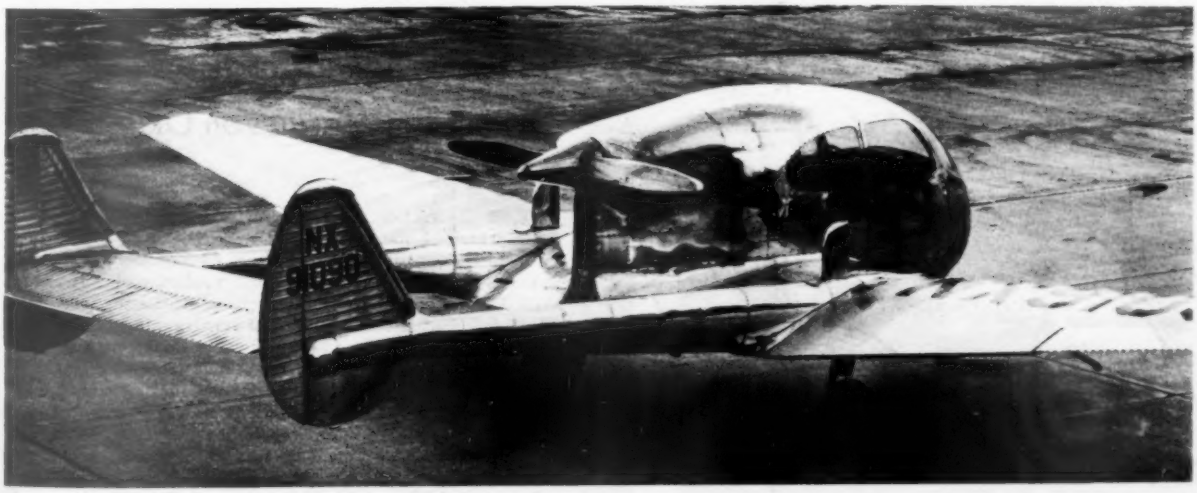
Recently, however, military specifications have called for the rebirth of the pusher and manufacturers already have blazed a trail with the tail-first Curtiss *Ascender*, the flying wing Northrop XP-56, and the record-breaking Douglas XB-42 bomber.

Commercially, pushers have one major advantage over tractor types in that they provide a better view for the pilot. Military airplanes have shown that better speed performance is a definite pusher possibility. Such discoveries have provided the experimental impetus which may overcome other pusher design problems. Though the efficiency of a pusher propeller may be lower than that of a tractor, (*Continued on page* 100)

Hull adaptation for use of the pusher on flying boats is shown here on Republic's amphibian, the Seabee. Fuselage is sharply tapered to clear the propeller, strut reduces danger of walking into it.

Greater visual range afforded by the pusher is illustrated in this experimental model of the Piper Skycoupe. Seated well forward and slightly above the low wing, pilot has a much wider field of vision than in conventional types of lightplanes.

Pushed by a four-cylinder, two-cycle engine that develops 20 h.p., the Bowlus-Nelson glider adds the security of powered flight to the pleasure of soaring. Location of the pusher propeller permits the use of conventional glider-towing procedures.



Kaiser-Hammond Aircar, four-place version of the old Stearman-Hammond, provides ideal use of the pusher. Spin-proof character of the two-control plane make jettisonable prop unnecessary—a feature which may be required on acrobatic flight.

The Okinawa Rescue Mission

1 **Liaison planes** only 1½ miles from front lines on Okinawa work busily evacuating wounded Marines. Here, Stinson Sentinel lands while doctor instructs pilot of loaded plane waiting for take-off. Photos are by Lieut. C. V. Shireman, oxygen officer.

Precision flying rescued wounded Marines on Okinawa.

NEAR the end of the battle for Okinawa, an element of Marines of the 10th Army were pocketed for a time behind Jap lines astride the 14-foot concrete road south of Naha. Casualties were heavy. Marine officers asked AAF Lieut. Kenneth Nelson for help in evacuating wounded. What followed is one of the most remarkable liaison plane operations of the war. From dawn to dusk, for 3½ days, sergeant pilots landed Stinson *Sentinels* (L-5Bs) cross-wind on the narrow road flanked by rice paddies. At times they were under fire. For long periods military traffic had to go through to the front, only 1½ miles away. The eight-foot wheelspread of the *Sentinels* was never more than three feet from one edge or the other of the 14-foot roadway. Yet an estimated 750 wounded marines were flown out to a field hospital 20 miles away without the loss of a single plane!

2 **Narrow roadway** made it necessary to swing planes around and taxi them back for loading and take-off in the same direction they originally landed. Here, bulldozer operator walks to his tractor to resume dozing out a turn-around space for planes.

3 **Unloading whole blood** in background while Sgt. Pilot E. H. Zellar (who told story to FLYING), directs air traffic with flags.

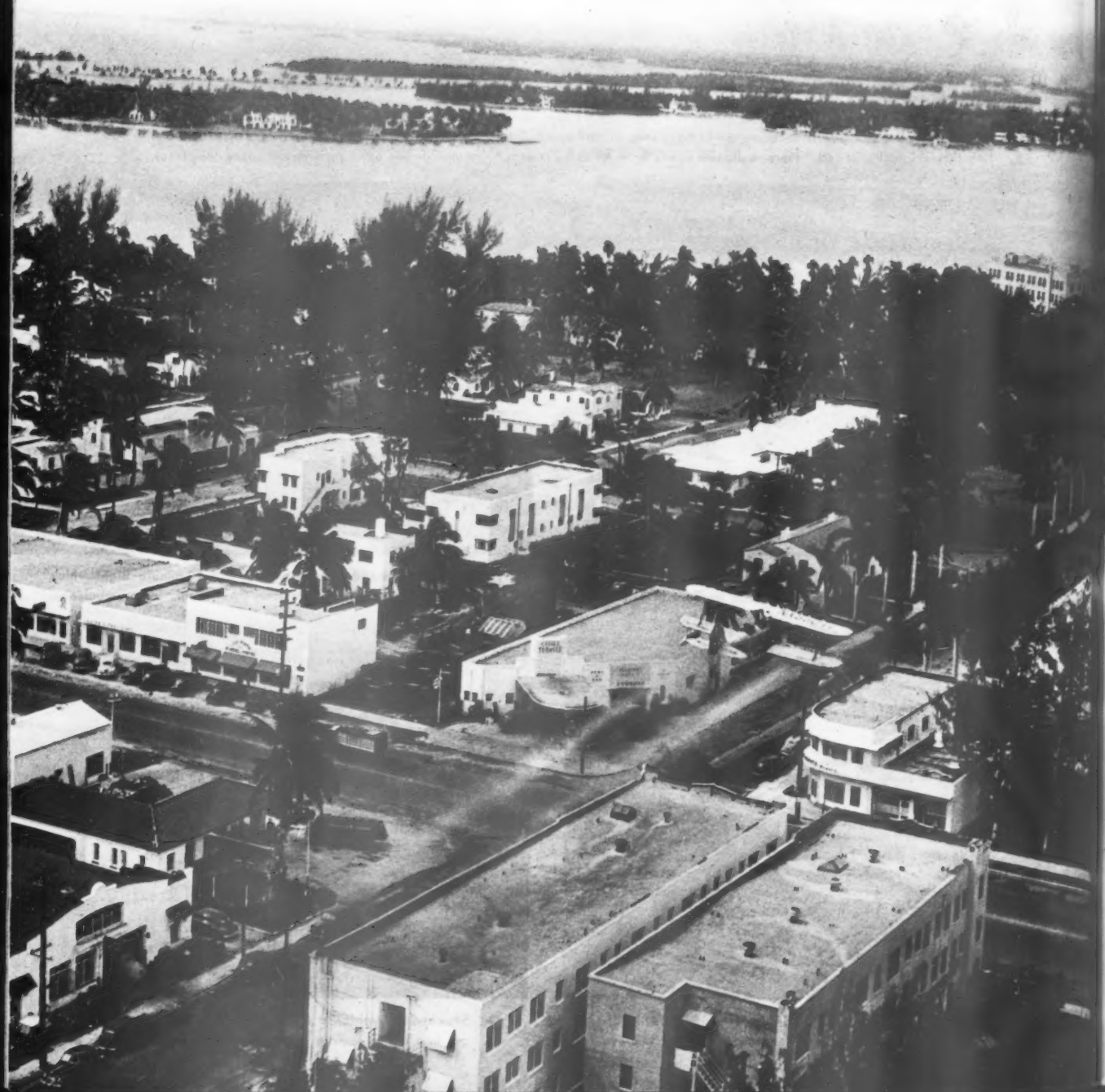
4 **Lifting wounded** men into plane for 20-minute flight which would take as long as seven hours for a rough-riding ambulance.

5 **Loaded plane** takes off with two others waiting to land. Sergeant Zellar slashed his signal flags out of supply chutes.

6 **Stacked up vehicles** at end of road wait for loaded plane to get into the air before going through to front 1½ miles away.

FLORIDA

Infantile paralysis was endangering Miami children until an ex-Marine pilot filled his seaplane with tanks of DDT and sprayed the city.



BUG BLITZ

Navy-built trainer, used for downtown spraying, has a spray tube mounted above the floats. Author loaded DDT at the county causeway (above), sprayed Miami and Miami Beach (left) from 50 to 100-foot altitude, often brushing tall trees along streets.

By JACK JACKS
as told to ARTHUR ROBINSON

I THOUGHT that I had known danger as a Marine pilot, but fighting polio with a seaplane is far worse than anything I experienced in the service. I flew up and down streets at 50-foot altitudes watching for street signs so that I wouldn't turn at the wrong intersection. Electric light poles, tall Australian pine trees and buildings strong enough to resist an earthquake were beneath the wings of my surplus Navy-built trainer from the time I took off until I landed.

This business began during a polio scare in Miami; cases had increased and flies were blamed. As a civilian pilot and president of R. S. Evans Aircraft, Inc., I had both the know-how and planes to do something about it. The Dade County Commission accepted my services and I tackled one of the toughest flying jobs of my entire career.

Two planes were used, the trainer and a Piper Cub flown by Bruce A. Hadley of Miami Springs. I chose the trainer for the downtown work as it had enough power for the rapid pull-outs that I knew would be necessary. Hadley covered the outlying districts. He flew at 50 m.p.h. and I at 75 m.p.h.

Hadley carried but 75 gallons of DDT in his tanks and could only spray for about five minutes. Followed by a truck, he would land on roads or golf courses and reload. I would land at a spot on the county causeway connecting Miami with Miami Beach.

We started operations each day at 6 a.m. and, if the wind stayed down, sprayed all day. On our biggest day, we

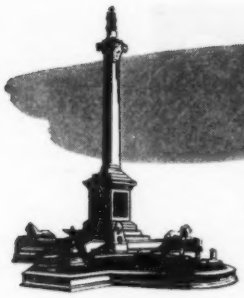
Everglades, possible breeding places of the virus-carrying flies, were heavily sprayed with DDT. While flying in the more populous areas (left), the author often encountered turbulent air currents which dropped his plane dangerously near rooftops.

sprayed 11 hours and covered 3,050 acres. However, if the wind rose over 10 m.p.h. we had to knock off. We laid swaths about 60 feet across and figured four swaths to the city block.

On my first day out I had the closest call of my flying career. The area to be sprayed was around the 22-story Dade County Courthouse and I was on the south side of the building at 120 feet when a downdraft caught me. It carried me down and down and, although I gave the plane full throttle and hauled the stick back, I headed straight for the roof of a hardware store. I missed that roof by a foot.

Every night we spent long hours repairing bent struts and patching wings from minor collisions with pine trees. Ordinarily, if a strut is bent, the CAA requires you to replace it, but we obtained a special CAA waiver.

The Public Health Service and Army doctors in South Florida said that ours was perhaps the best DDT spraying job they had ever seen. One Army medic said our results were better than those the Army got on Pacific Islands. END



London Letter

By

Maj. OLIVER STEWART

British Authority, Editor of Aeronautics

BRITISH flying clubs were dubious about 100 surplus Royal Air Force trainers offered to them at $200 each by the Ministry of Civil Aviation. The offer was calculated to take the place of any government subsidy which might be paid to the clubs. Provision of these surplus aircraft at low prices was to be the only form of state aid.

At a Piccadilly meeting of the Royal Aero Club it was said that many of the 60 *Tiger Moths*, 10 *Magisters* and 30 *Austers* offered were in such bad condition that it would cost up to $1,600 each to make them serviceable.

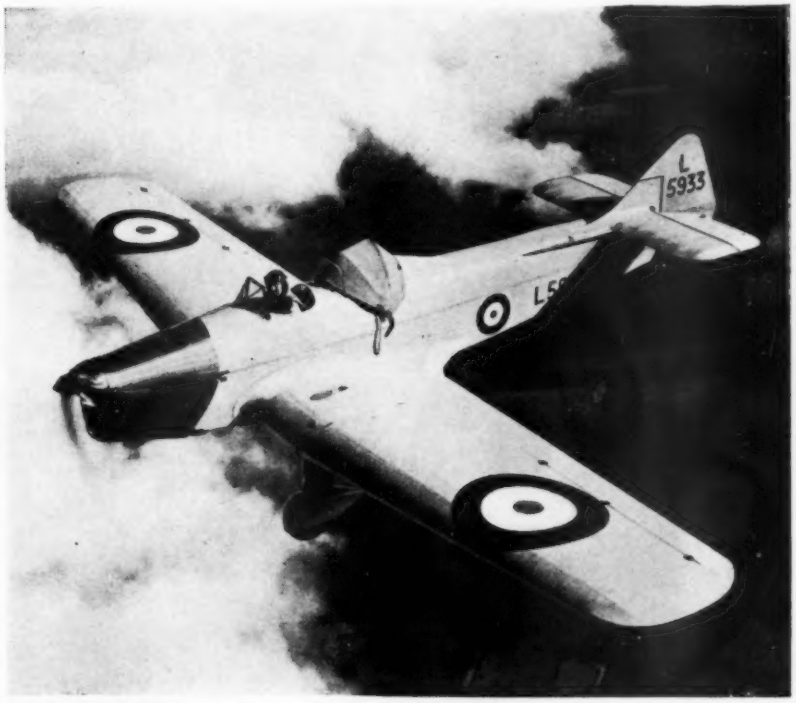
It was pointed out that, by accepting the aircraft, the clubs would be placing themselves under an obligation to the government without promise of any further government help. It was suggested that the clubs should look elsewhere for aid and Lord Nuffield's name was mentioned.

Final step was the disbanding of the General Council of Associated Light Aeroplane Clubs and the formation of the new Association of British Aero Clubs under the chairmanship of Air Comm. Whitney Straight. This association is going to fight for the interests of the 52 member clubs.

Crash Cause

First fruits of Lord Winster's decision to publish reports on serious accidents involving civil aircraft was a statement by Britain's Ministry of Civil Aviation about the accident to the *Hermes*, the four-engined Handley Page transport. Handley Page's chief test pilot and an engineer were killed in the crash December 2, 1945. Immediately after the *Hermes* took off from Radlett airfield, north of London, it began to porpoise until it finally stood on its tail and stalled sharply into the ground.

The official conclusion is that the accident was the direct result of elevator overbalance which "brought about flight conditions, the nature of which caused the pilot to lose control."



Miles Magisters are included in a group of 100 surplus RAF trainers offered to British flying clubs. One club is dubious of offer because planes have been heavily used and need extensive repairs. The Magister, made of spruce and plywood, has a 130-h.p. engine.

The rest of the report is less sweeping. The overbalance, it is said, could have set up the porpoising. But no satisfactory explanation has been found for the final nose-up position. There might have been a reversal of stick forces with which, as the loads increased, the pilot could not contend.

Air accidents are investigated by the Chief Inspector of Accidents and his staff. He reports to the Air Ministry or the Ministry of Civil Aviation and they decide whether to publish the findings. Secrecy about past British air accidents has been sharply criticized. Lord Winster's decision to remedy this situation is welcomed.

Isolationist Aircraft

Successful early test flights by the Avro *Tudor II* transport near Manchester reactivated the controversy about whether United States aircraft ought to have been ordered by the British Government.

Reason for ordering the five *Constellations* is that British state corporations otherwise would not have been able to operate effectively on the Atlantic routes for two or three years. It is held that the use of American aircraft is essential if Britain is to maintain her operating know-how.

Chief opposition to the purchase of American planes comes from the Air League of the British Empire, now much gingered up, with E. Colston Shepherd as secretary general and Air Chief Marshal Sir Philip Joubert as chairman of the council. Sir Philip has been writing to the newspapers deploring the use of dollars for buying American aircraft at a time when there is a shortage of dollars

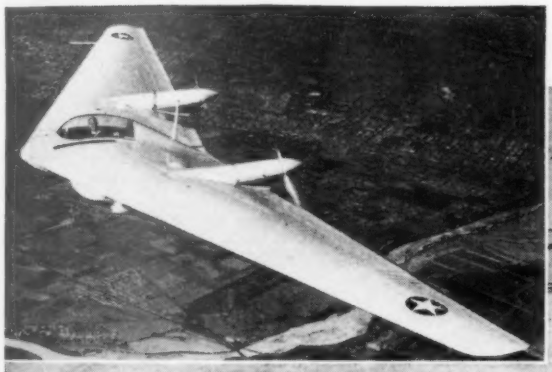
(*Continued on page* 82)

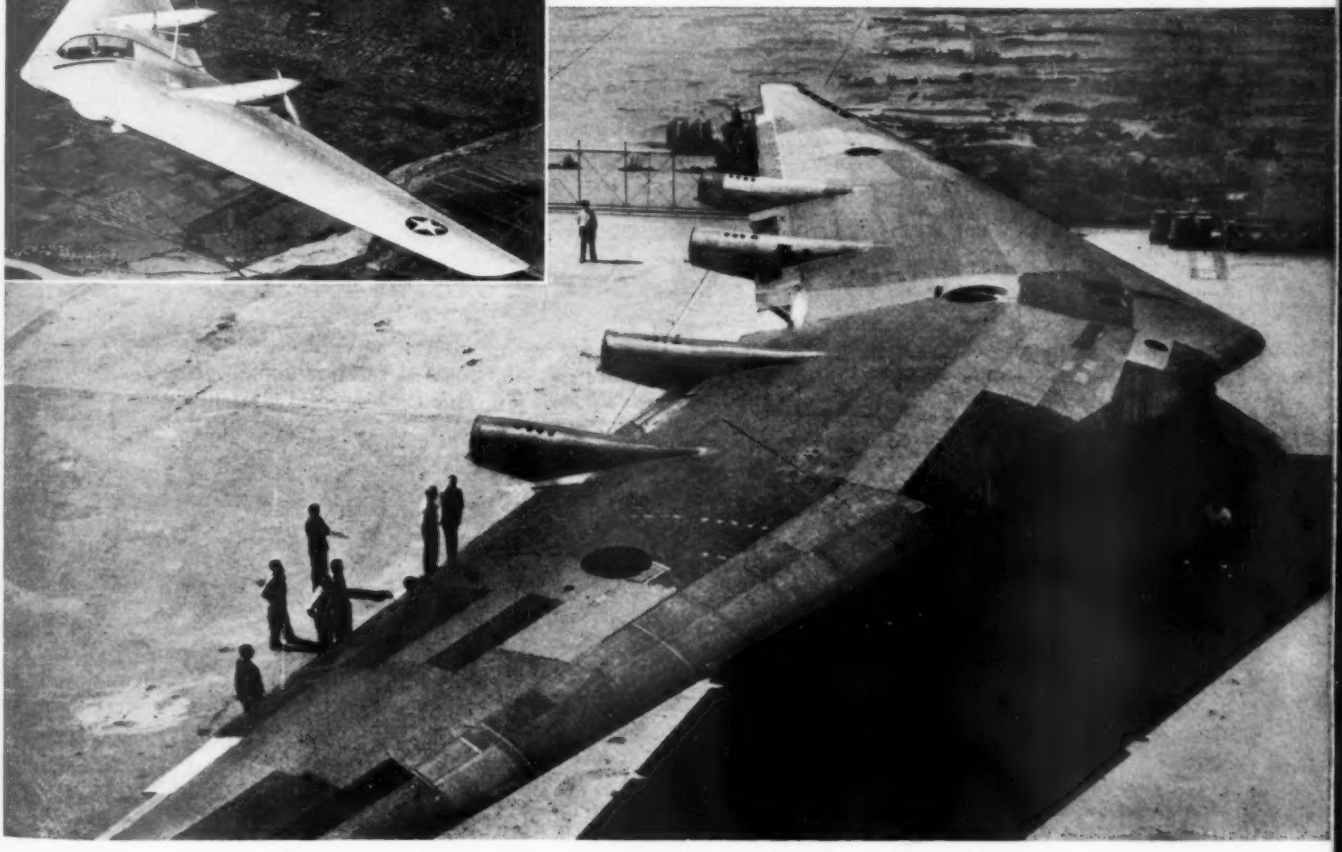
Have You Seen?

Culver V now undergoing ATC tests has novel forward-opening hatch and new Sensenich controllable propeller. Note pronounced dihedral in outer wing panel.

New Globe Swift will have 125-h.p. Continental, larger vertical fin and rudder. The prototype (shown here) has 153-m.p.h. top speed, cruises at 140 m.p.h., climbs 1,000 f.p.m. Known as the GC-1B, this version of the Swift is soon to go up for its ATC.

Northrop XB-35 is new AAF flying-wing bomber with four 3,000-h.p. pusher engines. Flying scale model (inset) tested XB-35 features in air.





Have You Seen?

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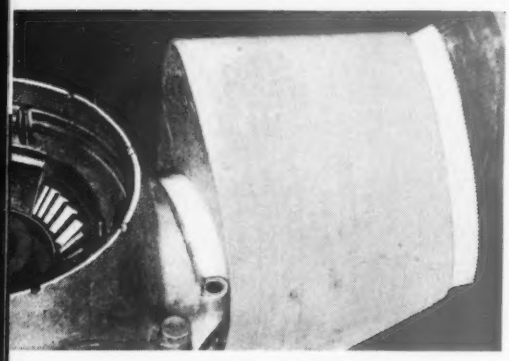
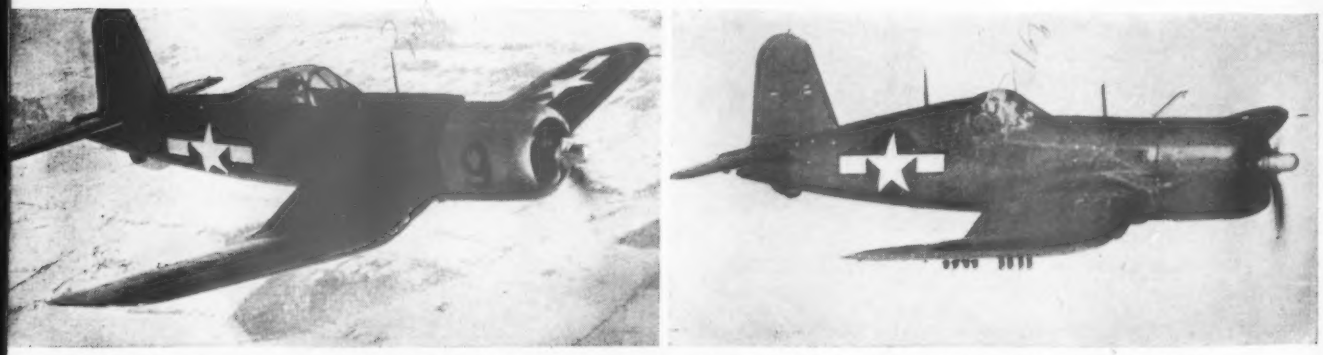


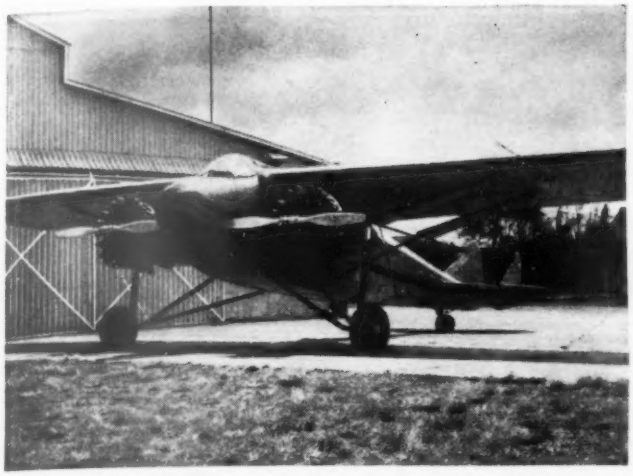
Balsa cuffs for propeller blades were developed by the Army to improve cooling of radial engines.

Surplus Kaydet trainers have been purchased by UNRRA for use in Greece and Bulgaria. Equipped with hoppers in the front seats, they will be used to spray crops, communities.

External cargo carrier has been developed for the Constellation by Lockheed engineers. Called the Speedpak, unit is quickly detachable; can carry more than most twin-engined airliners. Capacity is 400 cubic feet. Plane's cruising speed is cut 10 m.p.h.



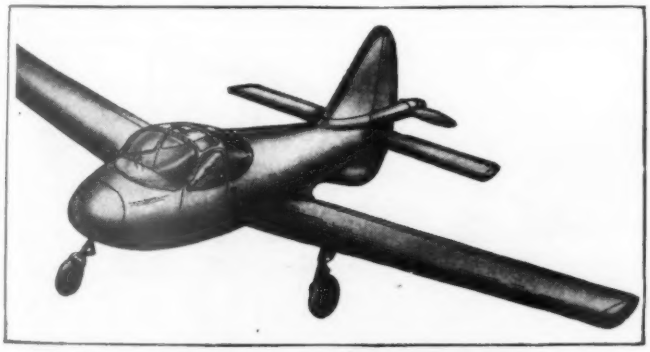
Latest Corsair version produced by Goodyear (left) is shown in comparison with the older Corsair (right). New model has 3,000-h.p. P.&W. engine, bubble cockpit hatch, modified engine cowl and air scoops. F2G has initial rate of climb of 7,000 f.p.m.



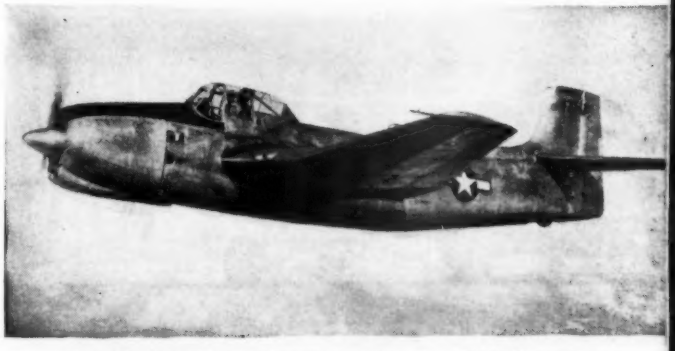
Costa Rican freighter is an old American-built Bach. Once tri-motored, it now has two 420-h.p. engines, is used by fruit company

Experimental Black Widow, XP-61E has small fuselage, bubble canopy, no radarman. Top speed is 370 m.p.h., range 3,500 miles.

Meyers MAC-125C is all-metal two-place lightplane undergoing ATC tests. It has 125-h.p. Continental, cruises at 120 m.p.n., stalls at 47 m.p.h. Range is 500 miles, gross weight, 1,675 pounds It has retractable gear, flaps and slots. Wing span is 30 feet.



Lockheed patent drawing is probably two-place Big Dipper company was testing recently. Engine in fuselage drives pusher prop.

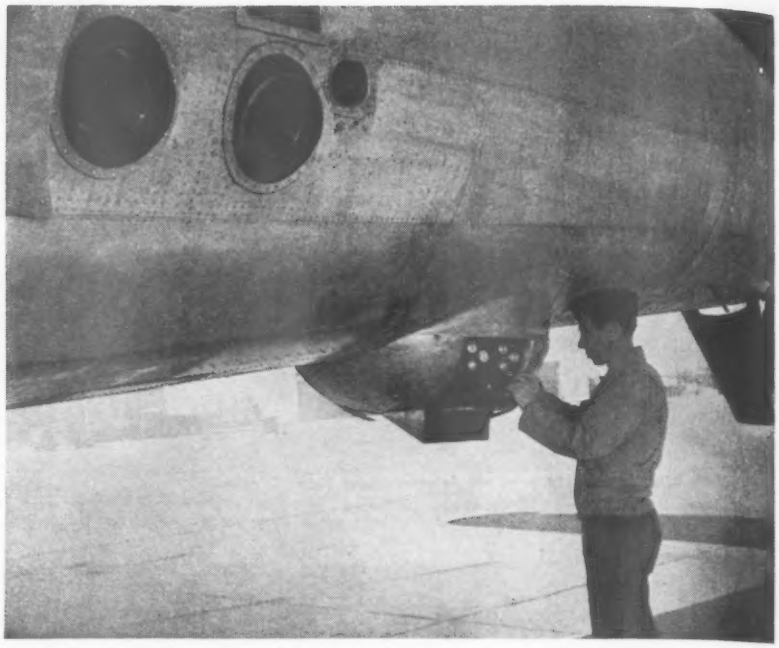


Convair XA-41 is experimental attack bomber with 3,000 h.p., four 37-mm. cannon, four .50-cal. guns It is one-place. Span: 54 feet.

Have You Seen?

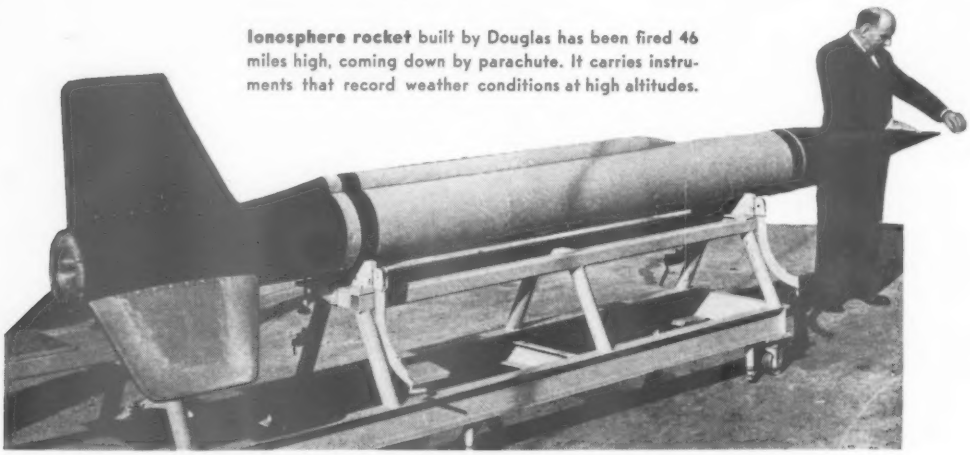
CONTINUED

New helicopter is Firestone (G&A) XR-9B. Its 135-h.p. engine gives it 80-m.p.h. cruising speed.



Atomic bomb tests will be photographed by Superfortress camera planes (F-13's). These are some of one plane's still and movie cameras. One man will run each plane's cameras.

Ionosphere rocket built by Douglas has been fired 46 miles high, coming down by parachute. It carries instruments that record weather conditions at high altitudes.



Boeing XB-38 was an experimental Flying Fortress (B-17E) with four Allison engines instead of the standard air-cooled Cyclones.

Ross sportplane soon will go on market with 65-h.p. engine. It is two-place, cruises at 90 m.p.h., lands at 38. Range is 230 miles.

I Learned About Flying From That!—No. 79

Author was flying at 6,000 feet when his burning cigaret blew into the fuselage.

Lieutenant Mishler, in CAP uniform, checks plane before flight.

By Lieut. HUBERT E. MISHLER, CAP
as told to HOWARD E. JACKSON

IT WAS 115° in the shade of the hangar. The blistering Arizona sun had been even hotter that August as it blasted down on the desert. Everything, even our *Cub*, was dried out. My one thought was to get into that plane and climb up and away from the blast furnace of the ground—up where it was cool. Besides, I was wondering just how high a *Cub* could go.

I had but 30 hours and, as I took off, I was keenly aware of my responsibilities. Five of us had banded together, organized the San Miguel Aero Club, and had purchased the plane second-hand. We only paid $900 for it but that was a lot of money to us. We didn't have any left to take out insurance.

Although the engine had had a recent major overhaul we all spent long hours fixing up the plane and putting new fabric on the underside. Luckily, two of our members are upholstery men and know about recovering with fabric. We took all the dope off the old fabric and cut the cloth back to within three inches of the lower outer longerons. Then we sewed the new covering in the center. There were a couple of inches of loose fabric sticking up where we made the seams but we left it that way.

I was thankful we had our own plane, that it was my turn to fly it, and that I was 6,000 feet up where it was cool. I felt good. I was sitting in the rear seat with the left-hand window open wide and the breeze sure felt swell. I pulled out a cigaret, lit it leisurely, took a puff with utter content.

But just as I went to toss the match away, a side gust of wind whipped the newly-lighted cigaret out of my mouth. I grabbed for it but it fell on the floor. I felt around frantically, hoping to find it with my one free hand. No luck. I bent over double and looked around my feet and under the seat as much as possible. I squinted into all the dark corners, but I couldn't see it.

Fear started to spread over me when I realized what I had done. I had dropped a burning cigaret onto the floor. It had blown back into the fabric-covered fuselage. If it rolled against those jagged seams the smallest spark would ignite the loose ends as though they were lint and the entire tail section would burn in a few seconds.

I couldn't crawl back through the small opening to retrieve the butt even if I did see it. As I couldn't see where it was I couldn't use the fire extinguisher. I would have had a devil of a time anyway trying to work the extinguisher and fly the plane at the same time. I didn't dare undo my safety belt and squirm around too much. And to top it all off, I didn't have a parachute.

I could smell smoke and thought I detected burning cloth.

At best it would take me 10 to 12 minutes to go down. I idled the engine and started to glide earthward with a minimum of air speed, lest I fan a spark into life. Had I been experienced I would have put the ship into a spin and come down pronto.

I shut the window to stop any draft and did some tight spirals until I was dizzy. 5,000—4,000—3,000—then I sideslipped this way and that. It seemed like an eternity to descend to 1,000 feet. I don't know how long it actually took—I certainly wasn't wasting time looking at my watch—but I guess about eight to 10 minutes.

I cut the engine as soon as I hit the ground, unbuckled my belt, grabbed the fire extinguisher and hopped out of that plane like I had been sitting on the hot seat. I made a thorough search but I never did find that doggone cigaret. I never even found a stub. It must have burned itself out and yet miraculously never ignited the fabric.

But I learned this: No smoking, fire extinguisher or no fire extinguisher. I'm playing safe! END

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

The Aircraft Owners and Pilots Association (AOPA), with National Headquarters Office located in the International Bldg., 1319 F Street, Washington 4, D. C., is a non-profit organization composed exclusively of pilots. It looks after the pilot's best interests in all phases of aviation and helps individual pilots with their individual problems. The AOPA operates with a full-time professional staff and is the largest group of civilian pilots in the world. This column is edited by the Aircraft Owners and Pilots Association and opinions contained in it are not necessarily those of FLYING. A special bulletin is sent each month to all registered AOPA pilots and also confidential newsletters from AOPA's Washington staff are sent members from time to time.

DO AIRLINES ENDANGER LIGHTPLANES?

Are airlines dangerous to personal aircraft? We are at least half serious when we ask this question. Airlines have asked the question in reverse on many occasions and they, too, were at least half serious. We think that on occasions the shoe may fit the airline boys as well as the non-scheduled pilots. And the Civil Aeronautics Board seems to agree. In at least two reports involving collision between personal aircraft and airliners, CAB places blame on the airline pilot.

Some of the details in these reports are interesting in themselves. They comprise the sort of defense non-scheduled pilots can use when there is loose talk about segregating traffic at airports and giving priority to airliners.

Consider, for instance, the American Airlines flight which ran down a Taylorcraft near Saline, Mich., on December 24, 1944. It's true that no one was injured in the accident. The DC-3 was landed successfully, though sustaining major damage. But the Taylorcraft's rudder and elevator controls were rendered inoperative by the impact and its occupants were saved only because they were wearing parachutes and used them successfully. The plane was demolished upon impact with the ground. Both the airliner and the non-scheduled plane were in level flight at the time of the air collision. The weather was overcast at 6,500 feet with scattered clouds at 3,000 to 3,500 feet; visibility, approximately 10 miles. The accident occurred at about 2,500 feet. The CAB report stated:

"The Taylorcraft, a side-by-side trainer in which the student sat on the left, was overtaken from the rear and left. Only the student could have seen the approaching DC-3 and to have done so would have required her looking backwards. A high, thin overcast which prevaled precluded the possibility of sun glare impairing pilot vision . . . Upon the basis of available evidence the Board finds that: weather conditions were good and had no bearing on the accident . . . the Taylorcraft being overtaken by the fast DC-3 had right-of-way according to Civil Air Regulations . . . at the time of the collision the attention of the DC-3 captain and first officer was diverted to duties inside the cockpit. . . . Probable cause: lack of vigilance of the crew of the overtaking DC-3."

Let's look at another official accident report of the CAB, one which indicates both non-scheduled and airline pilots to have been anything but vigilant. On September 26, 1945, a TWA airliner collided with a privately-owned Boeing trainer at Chicago, killing the two occupants of the private airplane, but with no injuries to airliner personnel.

Again, both aircraft were in level flight when the accident occurred. The CAB in this case stated that "Upon the basis of the foregoing evidence the Board determines that the probable cause of this accident was lack of vigilance on the part of the pilots of both aircraft." But in their findings appears this interesting fact: "The two aircraft were on intersecting courses and the trainer, to the right of the DC-3, *had the right-of-way according to Civil Air Regulations.*"

As traffic continues to become more dense around busy city air terminals, sloppy flying on the part of non-scheduled pilots can be tolerated less and less. Private pilots will have to concentrate on traffic patterns and good flying habits. Most of them do now. The record is also quite clear that airline pilots also will have to stretch their necks a bit in keeping local traffic under closer observation.

UNAUTHORIZED USE OF AOPA INSIGNIA

A few reports received at our national headquarters indicate the improper use of AOPA car emblems and wing insignia. AOPA would like to have the license numbers of automobiles on which the AOPA wing emblem is displayed by a non-AOPA member.

The same applies to the wearing of the AOPA lapel pin. This wing is reserved exclusively for bona-fide civilian pilots who have registered such status with the Aircraft Owners and Pilots Association. The wing is not to be worn by non-pilots or by members who are not in good standing. AOPA members have every right to challenge the wearer of the AOPA insigne at any time and to ask for proof of active membership as evidenced by the pilot's registration number on credentials issued to AOPA pilots.

NACA REPORTS ON RESEARCH PROJECTS

Reproduced herewith for the information of AOPA pilots is a letter addressed to J. B. Hartranft, Jr., General Manager, AOPA, from Mr. J. W. Crowley, Acting Director of Aeronautical Research, National Advisory Committee for Aeronautics.

"Dear Mr. Hartranft:

"This will acknowledge receipt of your letter of March 11, 1946, in which you requested information regarding the Committee's plans for conducting research on personal aircraft problems.

"I should like to advise you that, as we stated in our letter of January 4, 1946, to Mr. L. P. Sharples, the 18 proposed research projects contained in his letter of October 10, 1945, were reviewed with interest by our Committee on Aerodynamics during its meeting held on November 27, 1945. Mr. Sharples' letter since that time has been utilized by our laboratories in organizing a research program on personal aircraft problems. As these actions indicate, Mr. Sharples' letter has been of definite value to the committee, and I should like to express again our appreciation to the Aircraft Owners and Pilots Association for bringing these suggestions for research to our attention.

"I believe you will be interested to know that some of the investigations of the NACA personal aircraft research program already are in progress. In this connection there is an investigation under way to determine the proportions of the total noise of a typical light airplane chargeable to the engine and its exhaust, to the propeller, and to other causes. It is planned that the project will also include a study of means for reducing propeller noise, based upon analysis of existing information on the subject. At the conclusion of this project consideration will be given to conducting further research on the noise problem.

"In the last paragraph of your letter you expressed the opinion that the NACA is in a good position to carry out certain development projects associated with personal airplane problems. I should like to explain in this regard that, in accordance with the overall NACA research policy, our personal aircraft research program is devoted primarily to fundamental research. In this way it is expected that the results of the program will be widely applicable to the design of personal aircraft. *The application of such research in the development of improved personal airplanes is, of course, the province of the manufacturers.*"

The italics in the last paragraph of Mr. Crowley's letter are our own. Past experience has shown only too well that there is a tragic time delay between actual research and the application of research findings to the manufactured aircraft. The normal operation of competitive business tends to encourage adoption of new design and safety features in personal aircraft but it is probable that greater acceleration can be achieved if the consumer is accurately informed regarding the results of scientific research. It will be AOPA's purpose to keep its members fully informed regarding all phases of safety and design research.

To the NACA we extend our hearty congratulations. This research has been a long while coming and is desperately needed. There is an equally pressing necessity to seek the adoption of its findings by manufacturers so that the flying public may receive the full benefit. END

Big Power Boost—

FOR ALL PLANES!

NEW Mobilgas AIRCRAFT

GIVES FLYING HORSEPOWER

NOW greater than ever before, war-proved super power *plus* —it's *Flying Horsepower!*

And today both private and commercial plane operators can get this sensational performance from *new* Mobilgas Aircraft!

Since the end of war, new improvements have been added to this great aviation gasoline to boost already high performance standards *still higher!*

Get *new* Mobilgas Aircraft for *Flying Horsepower!* It's the result of the world's greatest catalytic cracking program!

Mobilgas AIRCRAFT

SOCONY-VACUUM OIL CO., INC. and Affiliates: Magnolia Petroleum Co., General Petroleum Corporation.

THE LIBRARY

THE CASE AGAINST THE ADMIRALS, by William Bradford Huie; published by E. P. Dutton & Co., N. Y., in 1946. 216 pages. Price $2.50.

A sharp controversy already is stirring about this book, which contends that modern air power has made the Navy helpless, that the Navy nevertheless has deliberately obstructed the development of air power, that the Navy is more interested in maintaining its own prestige than the welfare of the United States, and that our competing services can never be modern or efficient until they are all organized into a single department of war.

Even the major sea battles of the past war were victories for air power, Mr. Huie contends. There were only four occasions during the entire war, by the Navy's own account, in which American battleships fired upon enemy ships. None of the big new $100,000,000 battleships ever fired anything but their secondary batteries in anger.

The author argues convincingly that the Navy was largely responsible for regulations which limited Army bombardment planes to a 300-mile range so they could not operate effectively far at sea. He charges that insistence on the 300-mile range (with the connivance of Army ground generals) delayed the development of all U. S. heavy bombers and was a primary reason for the underdevelopment and inadequate numbers of *Flying Fortresses* when the war began.

Huie alleges that in "a fratricidal struggle for command," the admirals and the generals fought and connived to see whether the Army or the Navy would have most power and most authority. In the Atlantic theater, the Navy had little opportunity, so it turned its attentions to the Pacific. Having discovered it couldn't absorb MacArthur, it sought to wall him off. In the Canal Zone the Navy refused to co-operate with General Andrews whom the President had made supreme commander with "complete responsibility" for the canal.

Huie outlines a disheartening story of bickering, antagonism and lack of co-operation between the services. In France, he says, Navy doctors were advised not to help hard-pressed Army staffs. Army and Navy worked independently to develop duplicatory airplanes and armament. The Navy set up NATS to compete with already-successful ATC. There was an endless duplication of ground facilities in the war theaters.

The book that tells this story is consciously partisan. But it cannot be dismissed simply by charging that it is angry and intemperate. Mr. Huie's facts are now under fire, and he is vigorously defending them. With all its faults, the book is a convincing argument for unification of the services. —CURTIS FULLER

FLYING

"Which way to the United States Patent office?"

THE FUNDAMENTALS OF AVIATION, written for The New Home Library by H. L. Williams; published by The Blakiston Company, Philadelphia, Pa., in 1946. 282 pages. Price $1.

Here's a chance to add a good book to one's collection at reasonable cost. This book states in so many words what its thesis—one at which other writers have dared only to hint—is that *no one man invented the airplane.* Printed on lightweight, non-shiny, 8x5 paper, and written in easy, comfortable style, it retains high reader interest through use of 146 black-and-white cuts. A minor criticism of its styling might cite the lack of sub-titles, which often causes the reader to grope for continuity.

One of the most interesting of its 14 chapters is entitled "Props, Rotors, Rockets, and Jets." It contains one of the few clear explanations I've found of how rockets and jets actually work. The same chapter gives the only description I've found (after perhaps a not too thorough search) of the difference between a helicopter and an autogiro.

Although this book claims for advisers such well-known Technical Consultants as Casey Jones, at least one error was permitted to slip by. On page 157 the statement is made that in a steep turn ". . . the elevators will act as a rudder in turning the plane faster or slower," a mistake which even elementary knowledge of flying should not have allowed to pass undetected.

What is best about this work is that it does cover the fundamentals of aviation —and it does it in a manner that is both interesting and readable. Aviation history, mechanics of flight, technique of flight, effects of flight on the body, engines, navigation, and the airlines—Mr. Williams has compiled facts about all these into a valuable source book that is also a readable treatise for diversion and entertainment. —JOHN R. HOYT

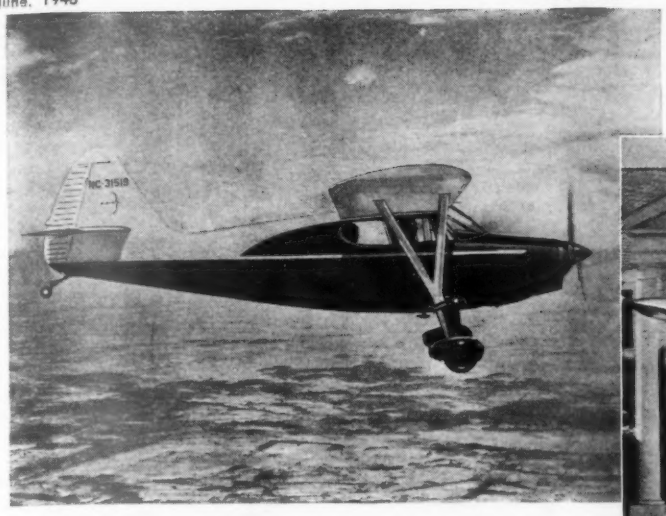
SHORT VIEWS

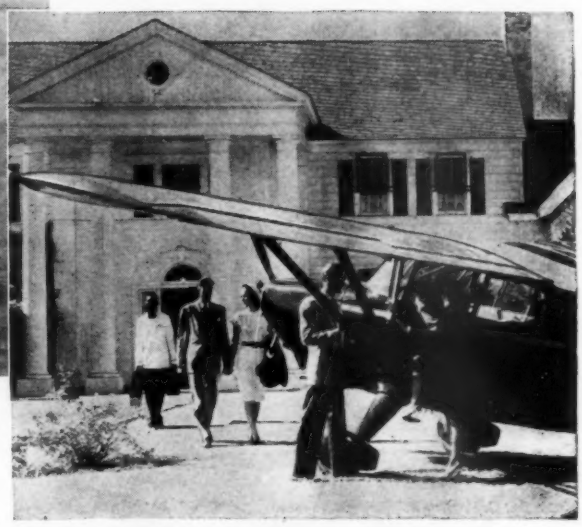
CIVILIAN WINGS FOR EVERYONE, published by the Shell Oil Company in 1945. 40 pages. Free.

Here is an informative booklet which should interest both novice and veteran pilots. In simple terms it describes an airplane, tells how it flies, explains how to get a pilot's license, gives basic weather information and outlines the rudiments of aircraft handling. The introduction is by T. V. Wright, administrator of civil aeronautics.

YOUR POST-WAR PLACE IN AVIATION, by Russ Brinkley; published by Aviation Press, Inc., 113 W. 42nd Street, New York 18, N. Y., in 1946. 96 pages. Price 50c.

Designed for the ex-service man, high school student and CAP cadet, this work outlines the various vocational opportunities and limitations of aviation. A thorough research and reporting job, it traces the development of the aviation industry and lists the literature that is available for a more detailed study of any of its own or its related activities.





When you put your Stinson Voyager 150 into a climb, you can sit back and relax . . . confident that it will take you over the mountains ahead. With this plane, you don't have to waste time and fuel in spiraling to gain altitude. The Voyager 150 climbs at the rate of 770 feet per minute, has a service ceiling of 14,000 feet.

And when you set the Voyager 150 down in a high-elevation landing spot, where the air is thin, you know you can fly it out again . . . and easily, too. Even at an elevation of 8700 feet, the Voyager 150 needs only 1350 feet to take to the air—and at sea level it takes off with a run of 550 feet. The Voyager 150 is truly a "fly-anywhere" plane!

Inside and out the Voyager 150 is a handsome plane and a luxurious one. Seats are richly upholstered and individually adjustable to your comfort. The cabin is soundproofed and has controlled ventilation. From its trim propeller to its smartly designed rudder, this plane's a thoroughbred!

Your choice of two striking color combinations . . . blue-yellow and maroon-gray. And in the Voyager 150 "handsome is as handsome does." This plane carries a useful load of 944 pounds.

You'll fly high, wide, and handsome

in the STINSON VOYAGER 150

The Voyager 150 puts you in easy reach of *everywhere!* It cruises at 125, has a top speed of 133 miles per hour. You can make a 500-mile trip in an afternoon.

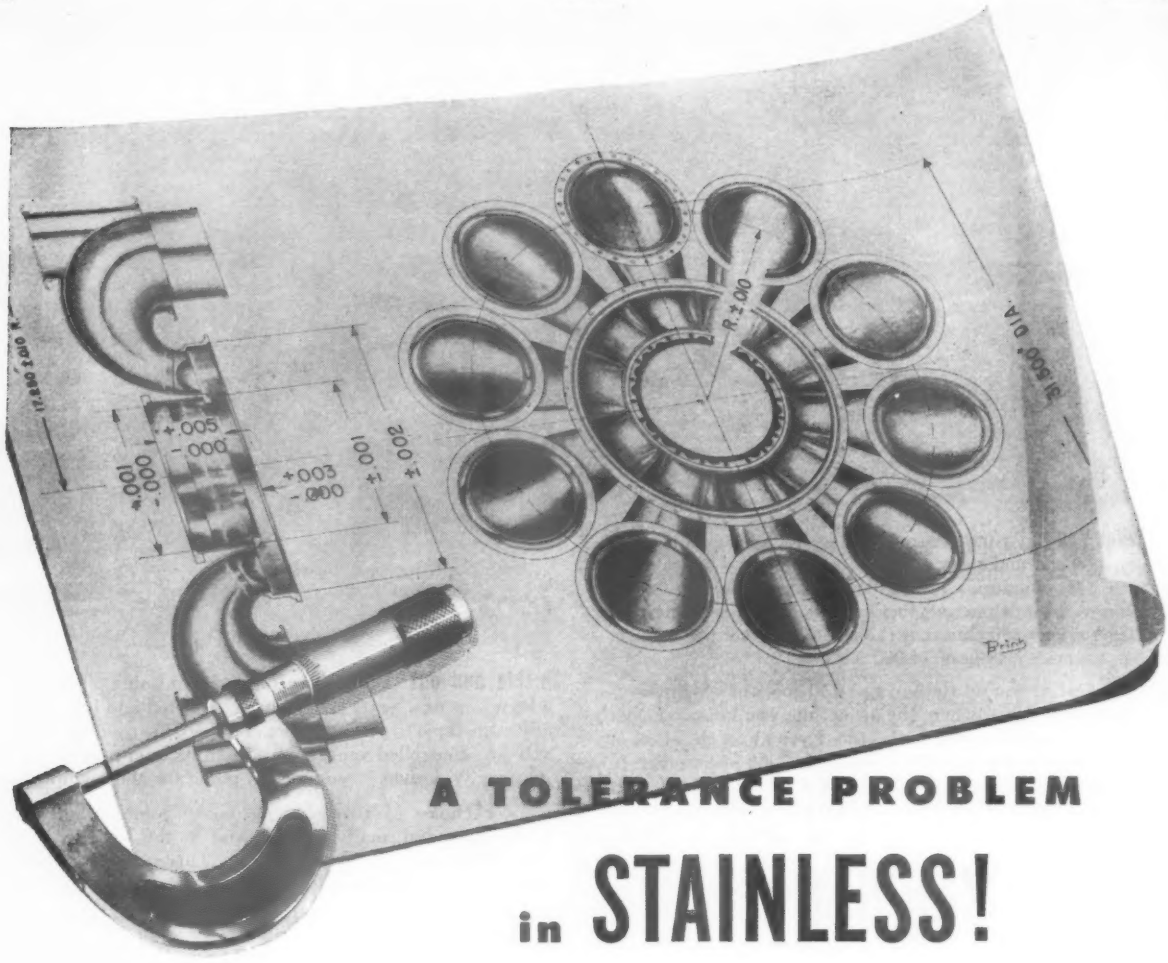
And you don't have to have paved runways to take off and land. Almost any field or pasture will do for this plane. You can go quickly and comfortably where you will in the Voyager 150. And economically . . . for operating costs compare favorably with the cost of operating your family car.

Stinson

EASY TO BUY . . . EASY TO FLY

Built by the company that has achieved a world-wide reputation for quality personal planes over the past 20 years, the Voyager 150 is now rolling off the production lines. See it at your Stinson Dealer's, or write for a free illustrated brochure to *Stinson Division, Consolidated Vultee Aircraft Corporation, Wayne, Michigan.*

Manufactured under Civil Aeronautics Administration Type Certificate Number 767



A TOLERANCE PROBLEM in STAINLESS!

JET ENGINES ARE HARD TO MAKE

Specifications called for this stainless sheet metal elbow assembly. Notice the indicated tolerances! A tough job in any sheet metal—a terrific undertaking in stainless steel!

BUT SOLAR TACKLES ANY STAINLESS JOB

Utilizing the exclusive SOL-A-DIE process of forming and Solar's own specially developed welding, fitting and processing techniques, Solar's engineers and craftsmen maintained these exacting tolerances under successive production contracts.

SO IF YOU HAVE A TOUGH PROBLEM . . .

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Designed and built by...

NORTH AMERICAN AVIATION INC.

CREATORS OF THE FAMOUS P-51 MUSTANG

The AAF's War of Research

(*Continued from page 18*)

government itself encouraged scientific research with no regard for its cost in money or lives. Research scientists were pampered. Basic research—scientific research for the sake of science without immediate promise of possible practical or technological application—was encouraged beyond the possibility of present appreciation in the United States.

"I am convinced," Herman Goering told Allied Intelligence officers shortly after his capture, "that the jet planes would have won the war for us if we had had only four or five months' more time." Germany, caught between the Russian offensive and the Allied invasion of the continent, lost the advantage of time but she also lacked fuel. Possibly with more time she would also have developed synthetic fuels for her jet aircraft. The fact remains we won the war none too soon. Goering also stated that Germany was developing a plane with a range that would have carried it to the United States. "Because our production capacity was not so great as America's," he said, "we could not produce quickly everything we needed." So, in a sense, it was good fortune that saved us—our good fortune to possess the resources that permitted us to become the arsenal of democracy and an aggressive defender of its principles.

Conscious of our superior resources, production capacity, and production "know-how," we have neglected technological research in a manner that suggests inertia and that certainly indicates indifference to our great potentials. Before 1939 a few forward-looking men in industry and in the Air Corps were encouraging research in aircraft techniques and in plane design—but with limited funds and limited authority. It was not until a few weeks before the actual outbreak of war in Europe, in September, 1939, that our Air Corps received the substantial appropriation of $300,000,000—a sum small in comparison with sums later appropriated but one that seemed large to the starving Air Corps at the time. Of this sum $3,500,000 was marked for research and development, which were now pursued in earnest. What was on the drafting board could now be made to appear on the assembly line. What had been theory could be given embodiment and become accepted fact.

We were fortunate that at the beginning of the war we had under development and manufacture or at least under project (perhaps only on the drafting boards) every combat-type plane which we had in operational use at the end of the war. The *Flying Fortress*, with which we accomplished the strategic bombing of Germany, was first flown in September, 1935. The *Superfortress*, that proved so successful in the bombardment of Japan's home islands after it was introduced in June, 1944, was on the drawing boards in 1939 and was officially announced in November, 1943. But from 1939 to 1944 is five years and there is no guarantee that as much time will be allowed for the development of the victory-winning weapon of another war. The *Thunderbolts* (1940), the *Lightnings* (1936), the *Mustangs* (1940) that accompanied and protected the *Flying Fortresses* and the *Superfortresses*—these and many other planes were in existence in one form or another when the Japanese bombed Pearl Harbor. But their range was limited. Equipment had not been developed that permitted precision bombing in spite of adverse weather conditions. We lacked almost all the many devices that were used before the war was over to give protection to planes and pilots. Had Germany advanced in technological development as she had in fundamental research, had she waited a few years to begin the war, or had she not made initial and costly mistakes in pursuing it, we might well have lost the war, or certainly not have won it as soon as we did. In short, had the United States, Russia and Britain not had the advantage of a time potential gained chiefly as a result of Germany's mistakes and shortcomings rather than through our own foresight and initiative, history might have been much different.

Spurred on by military necessity we changed rapidly—testing, discarding, improvising, standardizing. Our scientists, engineers and production chiefs performed miracles. We increased the speed of our bombers from 200 to 350 m.p.h., their combat radius from 900 to 1,600 miles and the effective operational ceiling from 20,000 to 35,000 feet. By war's end these bombers were carrying loads of 20,000 pounds instead of 5,000 pounds and were dropping bombs with various control devices undeveloped at the beginning of the war. Our propeller-driven fighters were increased in speed from 300 to 480 m.p.h., their combat radius from 200 or 300 to 1,000 miles, and they were redesigned and equipped to operate at the same or higher ceilings than the bombers. The jet plane was introduced as a wartime development.

It was, however, not only redesigning of engines and planes that permitted greater speed and increased range. Jettisonable external tanks for carrying extra supplies of gasoline, even food-warming devices to maintain pilot strength and efficiency on long, hazardous bombing missions, were also important. Demand systems for supplying oxygen to pilots, anti-blackout suits and electrically-heated suits for pilots to wear, and pressurized cabins on the *Superfortress* were essential when planes began operating at higher ceilings. Protection for planes from enemy fire was achieved by improved armament and by the development of a leak-proof fuel tank which greatly reduced the danger of a plane burning in combat. Protection for pilots was achieved by the development of body armor, flak suits and helmets, by improvements in the design and packaging of parachutes, and by escape kits and survival and rescue devices of various sorts, the most spectacular of which was the fully equipped lifeboat, to be dropped by parachute in rescue work over large bodies of water.

The effectiveness of the airplane as a combat weapon was increased in several ways. The .50-caliber aircraft machine gun was one of the most reliable weapons of the war. This weapon, developed before the war, was improved until it had a cyclic rate of fire of 1,200 rounds per minute. No gun smaller than the .50-caliber was installed in any combat aircraft. Our 75-mm. aircraft cannon (first mounted on aircraft in 1939) was the heaviest gun mounted by any air force. Training in aerial gunnery was made more effective with the development of a .30-caliber frangible bullet of plastic material, strong enough to be fired and yet light enough to shatter against the specially armored target aircraft without damaging it.

Rocket-launching equipment was successfully installed and utilized on medium and light bombardment aircraft and on fighters. More effective types of in-

(*Continued on page 74*)

15 YEARS AGO

FROM the June, 1931, issue of this magazine:

German Inventor Johannes Winkler had developed a rocket which could be controlled from take-off to landing point. Using gasoline and liquid oxygen for fuel, the rocket traveled 660 feet reaching an altitude of 3,000 feet. It was demolished on its first landing.

Fokker was experimenting with a "mystery" fighter which mounted four machine guns in the leading edge of the wings. It was to carry a 500-pound bomb at a top speed of 210 m.p.h.

Either build-it-yourself or fly-away-factory models of the Corben *Baby Ace* were offered by the manufacturers with either a cabin or an open cockpit, 30 to 45 h.p. and a cruising speed of about 85 m.p.h. . . . A Franklin two-place sport trainer had just gone on the market at $3,350.

The Navy was ready to start construction on a new aircraft carrier which, unlike the converted *Langley*, *Lexington* and *Saratoga* then serving with the fleet, would be built from the keel up as a carrier.

M. Bleriot, the French aircraft manufacturer, offered a $4,000 cup to the first pilot to attain a speed of 625 m.p.h. The donor predicted that that speed would be reached within the next three years.

Clyde E. Pangborn and Hugh Herndon were planning a round-the-world flight in a Bellanca plane. . . . Cellophane was tested for wing covering by German scientists who conducted experiments with a glider. . . . The first of nine twin-engined Martin flying boats was delivered to the U. S. fleet stationed in Cuba.

The first approved type certificate for a midwing airplane was issued by the CAA to the Emsco Aircraft Corp., for a two-place sport monoplane. Three engines with horsepower ranging from 160 to 170, were offered for the model.

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Yes, the Funk F 2 B is one of the most *complete* and *safe* light planes in the sky with a cruising speed of 100 MPH and a cruising range from 350 to 400 miles. Its initial rate of climb is as high as 1000 feet per minute with ordinary load. Safe, low landing speed of 37 MPH. It's a really complete luxurious plane . . . one you'll have to see and fly to fully appreciate.

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A new factor has entered into airplane buying which necessitates a new factor in your planes. Today you sell *both* men and women—which means smartness has become as essential as utility. And now you can have instrument smartness added to your interiors as new as your plane design. *Working with you,* Pioneer* will design an instrument panel custom-made to your planes, that can be installed as a unit. Marked savings in your assembly costs and reduced maintenance are made possible by this unit system of installation. Find out about this *new* method that leads to more sales and lowered manufacturing costs for you.

ECLIPSE-PIONEER DIVISION
of Bendix Aviation Corporation
TETERBORO • NEW JERSEY

(*Continued from page 70*)

cendiary bombs were developed, and bombs and clusters with better aimability and greater penetrating power. Special fuses, of which the most publicized is the proximity fuse, were developed for use on various types of fragmentation and general purpose bombs to permit reliable air-burst functioning.

The Norden bombsight, perhaps our most prized and heavily guarded secret at the beginning of hostilities, proved as effective in operations as non-tactical experimentation had led us to believe. It was early recognized, however, that a system of guiding missiles to the target by remote control was not only desirable but practical. Guided missiles emerged in the form of standard bombs fitted with a radio brain. *Azon*, introduced in Italy in 1942 and later used very effectively in the China-Burma-India Theater, was such a missile. Not satisfied with this accomplishment, our research experts developed *Razon*, a missile with a more advanced "radio brain," which gave it greater accuracy. *Razon* was ready for operational use against the Japanese when hostilities ceased.

In spite of our miracles of development and of production, our inventiveness, ingenuity and daring, we still remained behind Germany in many ways. General Marshall has reported the initial and continued advantage Germany enjoyed "almost to the end of the war" in the triple threat 88-mm. rifle and in smokeless, flashless powder. A more dramatic illustration of German technological achievement was the robot bombs of both jet and rocket types. These destructive and terrifying missiles were not launched against England until after the Allied invasion of the continent had been started, but they did not cease to fall on English and Belgian soil and on American men and equipment until all launching platforms and equipment in Germany had been destroyed or captured, almost a year later. A postponement of D-Day would have permitted Germany not only to make greater use of this terrible weapon but to develop greater range, efficiency and dependability. A type of V weapon for use against the continental United States was being developed and the launching ramp for it had been constructed in Normandy. To prevent Germany from winning the war with her robot weapons, we sped our own plans for invasion and produced not only weapons for defense against them but destructive weapons to eliminate them. Before the war against Germany had ended we had even produced our own jet and rocket robot bombs and might have used them widely had we not possessed more effective weapons.

Next to the harnessing of atomic energy, the most spectacular development of the war was radar, developed by the British and Americans but also by the Germans, who at one period of the war made effective use of it in guiding bombers to their targets in Britain. Our development reached an effectiveness never achieved by the Germans, and in addition we developed counter-radar devices to disturb and prevent the enemy's use of radar in detecting the approach of our own planes. But we used radar not only to detect enemy planes and to direct anti-aircraft fire. We developed radar bombsights to overcome weather difficulties and bomb through overcast and darkness, and developed radar ranging devices for the solution of gunnery problems by fighter pilots and for navigational aids. One development of radar provided an absolute altimeter.

From the start of the war we had been handicapped by the time factor. We had sought to avoid war, we had told ourselves that for us there would be no war, that sea distances defended us from all attack. We did not prepare to defend ourselves in the war that had long been prepared against us. Once we had overcome the time factor, and under the urgent lash of war had put to use American production "know-how" and all the resources of American science, industry and national wealth, we began to realize the potentials in which we had all along been richer than any other nation. The development of the atomic bomb in the United States well illustrates how and what we did achieve, because both Germany and Japan were working toward the development of an atomic weapon before we entered the war. We overtook them in the race for development and actually prevented such development in Germany by defeating her before her own science and industry could turn this terrible weapon against us.

General Marshall remarked in his third biennial report: "The fact that we overtook Germany's headstart on the atomic explosive is comforting, but certainly should not lull us again into a state of complacent inertia." We cannot afford, now that World War II has been won, to prepare—either for the purpose of preventing or winning another global war—by neglecting our research and development while other nations pursue theirs. General Marshall also pointed out that though the Germans had a marked advantage during most of the European war in their smokeless, flashless powder, after the last war our own scientific development of such a powder "should or would have followed in the plants of the great commercial manufacturers had they not been subjected to bitter attack as 'merchants of death.'" Similar misguided attacks may be initiated to hamper technological development in the future.

At Wright Field, however, our Air Technical Service Command is continuing to project and to engineer developments of the sort that helped us to win this war. There the study of aeronautical science is to be encouraged further by the establishment of a new Institute of Technology (scheduled for opening in September, 1946) where long-range peacetime operation post-graduate work will be offered to selected AAF men who have completed engineering studies in civilian universities. At the headquarters of the Army Air Forces in Washington a new staff section for research and development has been established to co-ordinate all research in the field of military aviation between science and industry and AAF engineers. The intention of this staff is to keep Army aviation development well integrated and progressively advanced in all fields, and to direct and prosecute long-range projects in the field of research and scientific study.

Through encouraging pure scientific research and technological innovations, we intend to insure availability of the equipment and the technique of its operation, which is necessary to maintain readiness for an offensive. This availability has been declared to be our only sure defense in a war that might well be the push-button contest delineated by newspaper cartoonists.

Such warfare is possible. More probable is warfare of almost as terrible a type. The range of our own bombers has been increased to 6,500 miles and more. Altitudes of 35,000 feet have been easily navigated. Bomb loads of 40,000 pounds have been pioneered. Atomic bombs can be manufactured to be tremendously more powerful than the one dropped on Nagasaki. There is no reason to doubt that another war will be transpolar and stratospheric in scope and as

The GOLDFISH CLUB

The Goldfish Club was formed in order to give recognition to the thousands of pilots and aircrewmen who have ditched their aircraft or bailed out at sea and have saved their lives through the use of life jackets or dinghies. Army, Navy and Civil Air Patrol personnel are eligible for membership. To apply, the following information should be submitted to the American Secretary, Max Karant, Managing Editor, FLYING, 185 North Wabash Avenue, Chicago 1, Illinois:

1. Name, rank and serial number
2. Service address
3. Home address
4. Date and location of incident
5. Description of incident
6. Signature of applicant
7. Signature of commanding officer

A listing of the Club members, a regular feature in preceding issues, is continued below:

169. Downard, E. R., N
170. Fassbender, W. J., Jr., N
171. Hinz, E., Jr., N
172. Lockett, W. H., N
173. Hilding, C. P., N
174. Herrmann, A. H., N
175. Tilton, E. J., Jr. N
176. Schiefer, Cyril D., N
177. Freeman, Robert L., A
178. Levine, Leonard, A
179. Penn, Stuart L., A
180. Flader, Rudolf F., A
181. Sadri, Frederick F., A
182. Reinhardt, William L., A
183. Penton, Ralph G., A
184. Meriwether, Nicholas M., A
185. Moore, John W., A
186. Olchowski, Edmund B., N
187. Hamilton, Jno. W., Jr., A
188. Jones, Robert R., A
189. Lawrence, Sidney J., N
190. McCrary, Charles H., N
191. Williams, Malcolm "J", N
192. Seedorf, Robert R., N
193. Park, Rex O., N
194. Averitt, Richard G., N
195. Hartley, James D., N
196. Sondraker, Gordon W., N
197. Kunkel, John B., N
198. Briner, George A., A

A—Army; N—Navy.

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Here is the instrument that revolutionizes all former conceptions of comfort in air travel. Our Aeronautical Department will be glad to supply you with complete information about the Sperry Model A-12 Gyropilot.

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ALWAYS REMEMBER—Flying without your AO Calobar Sun Glasses is work . . . and mighty dangerous work, too! For dazzling *sun-glare* can obstruct your vision at the most critical moments.

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quickly won as started. Widely scattered but strategically located bases, completely equipped with elements of the proposed 70-group air force of 3,900 operating planes and 400,000 men, are necessary to support an effective striking air force that the aggressor knows can take off against him on the notice of minutes Intelligence that will function more rapidly, more correctly, and with greater authority than either Army or Navy Intelligence before Pearl Harbor must be maintained to give the necessary alert. But neither bases nor air force in being nor intelligence can be more important than technological development to implement and strengthen all these.

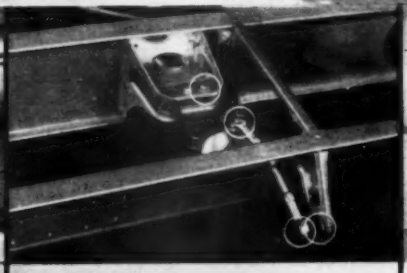
Fortunately, during the war just concluded we have made such tremendous advances and carried so many developments to the point of application and effective use that we cannot now, without deliberately, wilfully and blindly quitting the job undertaken, fail to carry on all these undertakings. For example, in the field of guided missiles, which the AAF was the only agency of the Allied powers to use in World War II, we already have achieved more than was ever believed possible. Pilotless aircraft used as guided missiles, radio brains for standard bombs, seeker controls which draw the bomb to sources of heat and light, bombs that ride the radar beams; these are already in existence. Further development might well lead to the accurate striking of a target by remote control from any part of the world.

Jet propulsion—for missiles and for aircraft—is already familiar enough to seem almost commonplace. General Arnold has predicted that "improvement of our jet fighters may well produce within the next five years an aircraft capable of the speed of sound and of reaching targets 2,000 miles away at altitudes of above 50,000 feet. When the barrier of compressibility has been hurdled, as it surely will be, there is no practicable limit to the speed of the piloted aircraft." The speed of sound at sea level, 761 m.p.h., is the present goal. The study of aerodynamics and new types of wing construction will s o l v e the problem of compressibility—almost solved by the Germans in their *Natter (Viper)* rocket plane—and permit aircraft to overcome the "shock-wave" created by objects traveling in the sonic range. Jet propulsion will give the power to drive the plane at transsonic or supersonic speed.

To the six distinct methods of utilizing atmospheric oxygen for propulsion—motorjet, turboprop, turbofan, turbojet, ramjet and pulso jet—may be added other methods. When General Arnold submitted his Third Report to the Secretary of War, in November, 1945, he predicted that these new and strange sounding words would become familiar ones in the near future, and asserted that they carried more meaning for Americans than any other six words he knew. When on January 26, 1946, the new jet-propelled *Shooting Stars* were flown from Long Beach, Calif., to LaGuardia Field, N. Y., in 4 hrs. 13 min. and 26 sec. at the rate of 584.82 m.p.h. and shattered the previous transcontinental flight record of 5

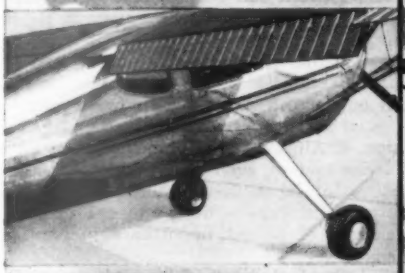
6 good reasons why you get *More for your money* in a CESSNA

1. The Large Luggage Compartment, behind the seat, is easy to load with two full-size suitcases and two large brief cases, or three suitcases. And there's a handy, roomy utility shelf for hats and parcels.



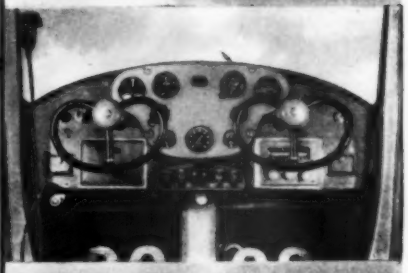
2. The Sealed, Friction-Free Bearings ... used in the control system ... insure longer life and smooth, free control action. Also note the sturdy, precision-built, heat-treated aluminum alloy wing structure.

3. The All-Metal Structure of the new Cessna 140 ... typical of the precision workmanship and fine quality materials you find throughout the entire airplane ... is impervious to damp or dry climates.



4. The Full-Range Flaps can be set instantly, for any desired angle of glide in the approach, with a touch of the finger-tip control. And they can also be used for unusually short take-offs.

5. The Patented, Low-Drag, Safety Landing Gear has no moving parts to wear, rattle or require maintenance. It actually combats ground looping tendencies and smooths out both rough fields and landings.



6. The Shock-Mounted Instrument Panel of the new Cessna 140 prolongs the life, accuracy and trouble-free service of the instruments ... another feature usually found only on planes of much higher price.

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See How Much More you actually do get for your money in either a Cessna 140 or a Cessna 120, at your dealer's showroom now. Both are sleek, fast, comfortable, two-place metal airplanes with real cross-country performance. Both are powered with 85 h. p. Continental engines. Both have fuel capacities of 25 gallons in twin wing tanks, top speeds of over 120 m. p. h. and service ceilings of 15,500 feet which means excellent take-off and climb. The Cessna 140, at $3,245 (f. o. b. Wichita) is equipped with all these features plus starter, generator and battery. The Cessna 120, at $2,695 (f. o. b. Wichita), is not equipped with starter, generator, battery and flaps. Compare Cessna with anything else in the air, for anything like the price, and you, like the pilots who know, will choose Cessna.

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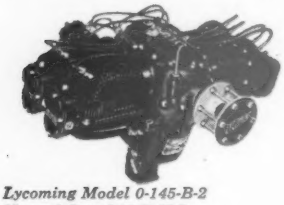

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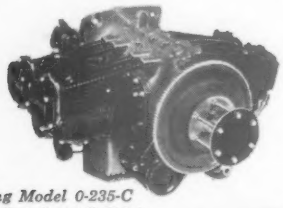

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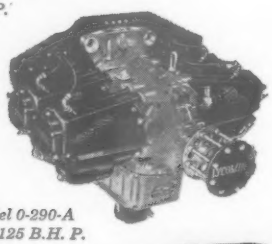

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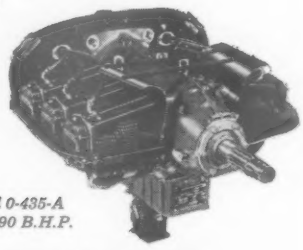

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hr. 27 min. established last December with a *Superfortress*, they put jet-power in the headlines with atomic bomb control, and into public consciousness as it had never been put before. The top ground speed attained by the leading plane was calculated at 660 m.p.h.—or about 30 miles less than the speed of sound at 41,000 feet. This indicated a true air speed above 550 m.p.h.

A healthy sign of our current state of national preparedness and of our determination to maintain this country's supremacy in military aviation is the program of demolishing surplus aircraft and other outmoded equipment of the types with which we won the war.

The scrapping of expensive airplanes may shock the taxpayer, yet the retention of surplus material discourages progress in research and development and directly, as indirectly, prepares for possible defeat in another war. Experimental work must not be handicapped by stockpiles of obsolete supplies. We must be prepared to replace about ¼ of our equipment each year. The weapons of today are the museum pieces of tomorrow—a fact we must keep constantly in mind as we buy ourselves the world's finest research program in aeronautics.

The best type of program of aeronautical research is that which we developed at Wright Field during the war and which we are continuing. Even before the formal surrender of Japan and one day before the dropping of the second atomic bomb, the President directed the Secretary of War immediately to develop a program for research and development which would maintain this country's unquestionable supremacy in military aviation.

The time lag between the idea for a new development and the reality of its use in combat is the margin of victory or defeat. We must put on our drawing boards now the weapons that will win for us, if war comes again. The budget of the Engineering Division of Air Technical Service Command for the fiscal year 1946 was revised, even increased to $200,000,000. Items which the defeat of Japan had rendered obsolete were eliminated and the program was augmented by the addition of projects now considered of utmost importance in our long-range post-war plans.

During the war, industry had absorbed a great amount of the cost of research. It now devolves upon the War Department to take care of the continuing development of projects which would naturally be abandoned by industry as war contracts were terminated and reconversion took place, and by various agencies and institutions outside the Government as attention became focused once more on the needs of men in a world at peace.

The Air Technical Service Command has not forgotten that its responsibility is not only to maintain the program of research and development already underway but also to encourage basic research and to discover new trends in warfare, such as the use of the pilotless aircraft, the apparent key to the push-button war of the future.

It is, therefore, vitally important to the welfare of our nation that our engineers and research scientists be given every opportunity to study principles and methods that will be necessary to open the doors to a better understanding of the principles of aerodynamics, of automatic flight control and of jet and rocket propulsion.

There must be found means of aiding the human body to stand the forces of the new transsonic speeds, and equipment must be developed to supplant manual operation in high performance aircraft as operation tends to exceed the capabilities of human beings. New materials, new fuels, lubricants and new protective devices must be discovered if we are to keep pace in this scientific race.

We mean to make no proposal for an armaments race, but we insist that in peacetime we do not forget the necessity for the research and development incidental to producing national strength great enough to discourage international trespassing. We cannot reasonably hope that other nations will neglect research and development. But we can make certain that our own program is superior to that of any other nation. This we are prepared to do. The situation today bears no resemblance to the situation in 1939, or 1941, when military air power had yet to demonstrate how and with what the wars of the modern world are to be won. But this is no guarantee against development of a similar situation at some later date. END

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The Navy's Air Reserve

(*Continued from page 23*)

The Ready Reserve will include 6,100 Naval and Marine flyers, 2,800 ground officers and 19,800 enlisted Naval and Marine aviation personnel. These men will be organized into air groups, squadrons, and units and maintained on a fleet-readiness basis. In the event of a national emergency they will be mobilized to meet the requirements of the Inactive Fleet or augment the Reserve and Active Fleets. The Active Fleet will be the peacetime Navy; the Reserve Fleet will be made up of a small proportion of ships which can be sent quickly to the aid of the Active Fleet; and the Inactive Fleet will consist of ships which will have to be outfitted and manned before being ready for combat.

Part of the Ready Reserve will be absorbed immediately into the Active Fleet which will not operate on a full-complement basis during peace-time. In event of war, however, most of the members of the Ready Reserve will be assigned to ships in the Reserve Fleet and be on their way to combat within a month or so. Others whose personal obligations prevent them from leaving in so short a time will be assigned to the Inactive Fleet.

Those who live near enough to a Naval Air Reserve Station to participate in the regular drill periods and go on the annual summer cruises will be eligible for the Ready Reserve. There will be four drill periods a month averaging eight hours a month flying time for pilots or 100 hours a year. Pilots, ground officers and enlisted personnel will be required to attend most of the drill periods plus the two weeks' cruise. They will receive one day's pay and allowances of their rank for each drill performed and the pay plus allowances of their rank for the two weeks' cruise.

The Air Reserve groups, squadrons and units will be organized as if they were part of the regular Navy. A typical CV group will consist of fighter, bomber and torpedo squadrons, and personnel will total about 125 officers and 65 enlisted personnel. This includes pilots, non-flying officers and men with aviation ratings. The commanding officer of the group will be a commander and the squadron leaders will be lieutenant commanders. Groups for CVLs and CVEs will be slightly smaller while groups for CVBs probably will be larger.

Non-flying officers will find billets in communications, electronics, supply, medical, ordnance, ground control, operations, and ACI. There will be enlisted aircrewmen as gunners and radiomen. The aviation ratings will include machinist's mate, electrician's mate, radio technician's mate, ordnance men, parachute riggers, photographer's mate, radiomen yeomen, pharmacist's mate, and others.

For refresher flying and syllabus flying in the Air Reserve program the latest models of Navy planes will be used. The present list includes current versions of the Grumman *Hellcat*, Vought *Corsair*, General Motors *Avenger*, Curtiss (and Canadian Car and Foundry) *Helldivers*, Curtiss *Seahawk*, Consolidated *Privateer*, Lockheed *Harpoon*, Martin *Mariner*, Consolidated *Catalina*, Consolidated *Nomad*, North American *Texan*, and Grumman *Duck*. All new models which are to be used in the regular Navy will be made available to the Air Reserve. In this way the pilots and crewmen of the Ready Reserve will keep abreast of the latest developments and changes in the aviation program of the regular Navy and be ready to join it without additional operational training.

The Standby Reserve will be made up of older men and the younger ones who, because of personal circumstances, cannot attend the regular drill periods set up for the Ready Reserve. These people will be organized into units for instruction, administrative work, logistics, and planning. They will receive no pay unless they attend the summer cruises and will be paid for that two weeks only. Pilots of the Standby Reserve will fly for 50 hours a year, as will the enlisted personnel assigned to flying duty in the Reserve. By far the greatest number of pilots will be in this category—many more, certainly, than the 28,700 in the Ready Reserve.

Twenty-two Naval Air Stations have been selected for the Air Reserve training. Fifteen of them will be reserve stations primarily; the other seven are major Naval air stations and will train reserves in addition to their other duties. These stations were carefully selected with several points in mind. The Navy had to make use of existing facilities and equipment and at the same time consider the areas where the greatest number of potential air reservists were located. In several sections there were plenty of potential members but no facilities. Yet in the western part of the United States there were stations which could be utilized but whose sparse population did not warrant the maintenance of a base.

The 15 reserve stations are at New Orleans, La.; St. Louis, Mo.; Minneapolis, Minn.; Squantum, Mass.; New York, N. Y.; Willow Grove, Pa.; Atlanta, Ga.; Memphis, Tenn.; Dallas, Tex.; Livermore, Calif.; Los Alamitos, Calif.; Grosse Ile, Mich.; Olathe, Kans.; Glenview, Ill., and Columbus, O.

The seven stations which will include reserve training as a secondary activity are at Anacostia, D. C.; Norfolk, Va.; Jacksonville, Fla.; Miami, Fla.; Seattle, Wash.; San Diego, Calif.; and Hutchinson, Kans.

Headquarters for the Air Reserve will be at the Naval Air Station at Glenview, Ill. It has been estimated that to man the 22 stations assigned to the Air Reserve approximately 990 officers, 9,800 enlisted men and 1,180 civil service employees will be needed.

For the present virtually all members of the Air Reserve will be veterans of World War II. However, recruits from the aviation cadet training program are expected to flow annually into the air reserves at the rate of 1,000 a year. Some eligible civilians also will be able to join.

Naval or Marine pilots now on inactive duty but interested in becoming members of the Naval Air Reserve should contact the commanding officer of the nearest Naval Air Reserve Station for reserve training. For the interim period they are eligible to fly the prescribed six hours a month and can obtain all the necessary details as to their status for the Ready or Standby Reserve programs.

Non-flying Naval and Marine air officers on inactive duty who want to participate in the Air Reserve should contact their nearest Air Reserve station for information about the program beginning July 1, 1946.

Former enlisted Naval and Marine aviation personnel who have been discharged should enroll in the V-6 or USMCR at their nearest recruiting station. In this way they will retain their ratings and be eligible for longevity pay. Both they and enlisted personnel on inactive duty under V-6 and USMCR should see the commanding officer of the nearest Naval Air Station. END

Naval Reserve Stations, 22 of them, are scattered throughout country as shown on map.

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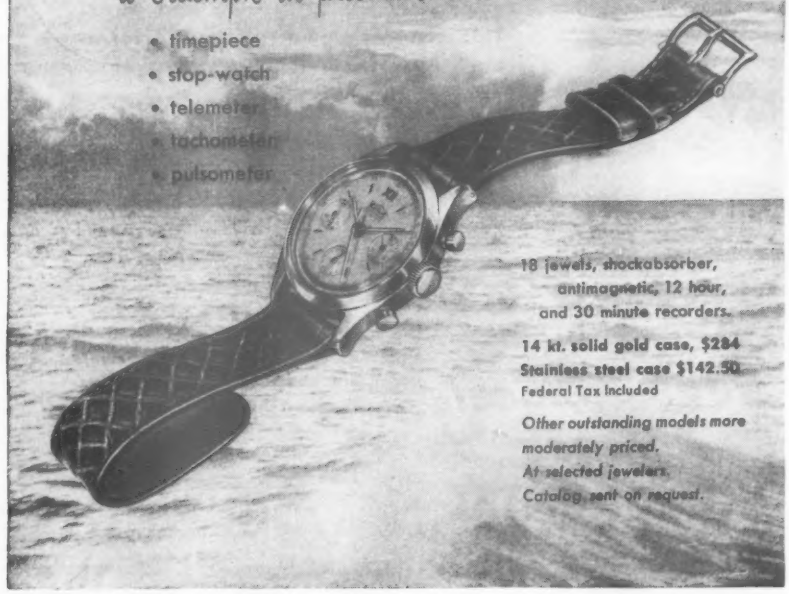

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London Letter

(*Continued from page 57*)

for the purchase of food and other necessities.

Informed opinion in Britain is still fluid but the tendency is to regard the purchase of American planes as a right step. Large British-built transports cannot be available in any numbers until late in 1947. American aircraft will prevent delays in operation.

University Air Squadrons

Oxford and Cambridge universities have had air squadrons for many years. Now the idea has spread to 16 other universities. The university air squadrons, which do instructional flying and have an annual camp, maintain a close relationship with the RAF.

The Cambridge Air Squadron is typical. Membership is limited to 100 and there always have been many more applications for membership than can be accepted. Four flying instructors conduct the training and an RAF officer commands.

Cambridge air squadron men did well in the war. They earned among them one Victoria Cross, three Commanders of the British Empire, seven Orders of the British Empire, 12 Distinguished Service Orders, 38 Distinguished Flying Crosses and eight Air Force Crosses.

Airport for London

Controversy about Heathrow, the airport intended to serve London, continues. Lord Sempill, experienced pilot and technician, criticized the triangular runway pattern as being "out of date." He advocated scrapping Heathrow and making a new airport somewhere else with a tangential runway pattern.

He wants the London airport to be called Lanchester Airport, to commemorate Dr. F. W. Lanchester, one of Britain's greatest aeronautical research pioneers, who died recently.

Famed for the Lanchester-Prandtl theory, Dr. Lanchester also studied air tactics and enunciated the N-squared combat law used successfully in China by Chennault, of the American Volunteer Group. Like so many great pioneers Lanchester died in poverty.

People In Aviation

Sir Arthur Sidgreaves, who has retired from the post of Managing Director of Rolls-Royce Limited, held that position for 17 years. He carried on the tradition of the firm's co-founder, Sir Henry Royce, who—in contrast with modern practice—paid scant attention to the demands of production men. His aim was to achieve the highest quality regardless of cost in money, man-hours or skill.

Sir Henry Royce's obstinacy in matters of design drove some production engineers half crazy but it gave the company its high reputation and Sir Arthur Sidgreaves adopted the same method. He was in charge during the company's most difficult period, when it was bearing a bigger war load than any other engineering company in Britain. END

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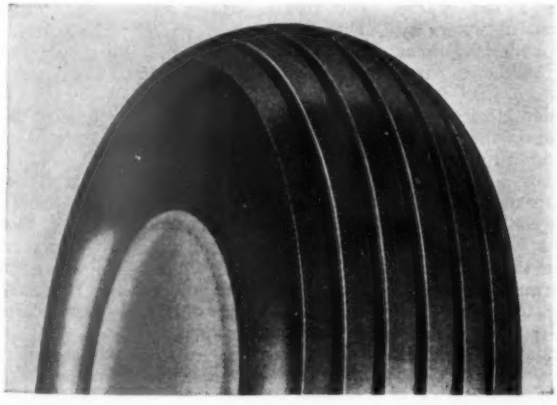

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Flying the Weather Map

(*Continued from page* 39)

inches and hundredths of inches reading.

Remarks are entered in English abbreviations which are easily translatable (and anyway there's usually a table of them posted at weather stations). They are always the last item in a station's teletype report.

Here is an authentic example of a batch of hourly weather reports on the Cleveland-Washington airway:

240030E

CV C 85⊕ 037/56/45↑↗14/962
AX C E60⊕8 051/54/46↑12/976
TEZ E50⊕3K— 061/55/46↑↗7/970
PT N◐/21/2K— 071/57/48↑10/973
BQ —⊕/6 081/52/40↗7/981
MR ⊕/ 088/47/40↑5/978
WA C —◐/4K— 108/58/43↑13/984

Take the first line:

CV means the report is from Cleveland. It's okay for contact flying. There's an overcast at 8,500 feet. Visibility is at least 10 miles since no limit is reported. Barometric pressure is 1003.7; temperature is 56° F. and dew point 45° F. Winds are southwest, blowing at 14 m.p.h. The altimeter setting is 29.62 inches. Nothing out of the way is happening, so the aerologist didn't send any "remarks."

Now, if you refer to Weather Circular N, which is found in every aerological office, you can read the reports of the other stations that reported at the same time. And with a little practice, you'll be able to read the teletype reports at any air station where you happen to be.

There's a lot of weather moving across the surface of the earth and to know what's going on in the atmosphere data must be collected from a great number of stations and from ships at sea. These data are collected at forecast centers by radio, telegraph and telephone four times a day, and then are used in the preparation of "six-hour" maps.

This adds up to considerable information and so to save space on the map, a formula has been worked out to show all the essential information in a relatively small space. Symbols are used in specified positions around a small circle to indicate what the weather is at any particular station at a given time. In general, this is the same information you just covered in studying the teletype. The circle, with its symbols, is called a "station model." A typical station model is shown on page 37.

In order to record wind velocities on a standard basis, Adm. Sir Francis Beaufort of the British Navy developed the Beaufort scale, and symbols have been worked out to permit applying it to the station models on the weather map. Wind direction is shown by the direction of the shaft of the arrow and the velocity is shown by the number of its "feathers."

By the use of symbols, all other factors of present and past weather can be shown in the circle of the station model.

When the symbols have been filled in on the circles for each of the reporting stations, all essential information is on the weather map. But there are literally hundreds of these stations and you haven't time to study each circle in detail. So the aerologist summarizes and further abbreviates weather information.

First, he analyzes the past weather, types the air masses, studies windshifts, pressure changes and precipitation areas. With this information he knows where the fronts lie on his weather map and he draws those fronts in with a pencil.

Then he studies the existing pressures at the various stations and pencils in lines connecting all the points which have the same pressure. These lines are called "isobars," and they are drawn at intervals of three millibars of pressure, for purposes of standardization. When all the isobars have been drawn, they automatically outline the shapes of the pressure fields, and thus they locate the high pressure and low pressure centers.

Now the aerologist begins to finish his map in a form that makes it more intelligible to you. He draws in the cold fronts with solid blue lines. (See page 86.)

Warm fronts are shown by solid red lines. If a front is stationary—that is, if the wind behind the front nearly parallels the discontinuity and gives it relatively little forward motion—the aerologist indicates it with an alternately red and blue line.

The surface front of an occlusion is shown by a purple line and the upper front is shown by a broken line. The line is blue if it is an upper cold front and red if it is an upper warm front.

Although weather maps drawn by aerologists are colored, standard symbols have been adopted for maps which are printed in black and white. The table on page 86 gives the black and white symbols for the various types of fronts.

Next the aerologist sketches in the precipitation areas which are associated with the fronts. He indicates precipitation with the color green and, if it is steady, fills in the area with solid green shading. If it is intermittent, he uses hatched shading.

In addition he shows the type of precipitation by using the appropriate symbols in green.

The aerologist's next move is to indicate the high and low pressure centers in such a way that you can pick them out quickly on the map. He uses a red "L" to mark the center of a low pressure area, or cyclone, and a blue "H" to represent the center of a high pressure area, or anti-cyclone.

Now he wants to show you something about the air masses between the frontal systems and for this he uses a very simple three-letter code cPK, for example.

The large letter in the center indicates the source of the air mass. "P" means that it came from the cold polar regions, and "T" means that its origin was in the warm tropics.

The small letter on the left indicates the type of surface over which the air has traveled, "c" if its course was continental; "M," standing for maritime, if it moved mostly over water.

The small letter on the right indicates

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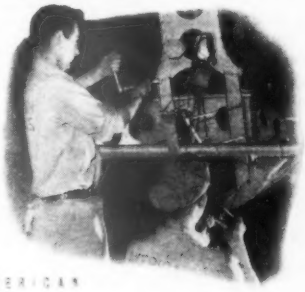
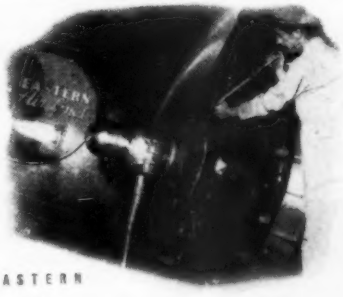

AMERICAN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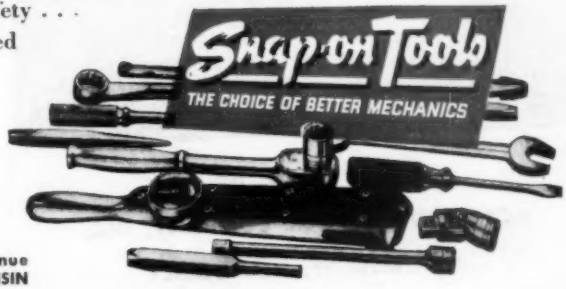

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the type of air mass, "K" for cold and "W" for warm.

Thus the symbol cPK on the weather map would identify an air mass as COLD POLAR CONTINENTAL air.

Now let's add up what you know from the colored lines and symbols the aerologist has drawn on his map.

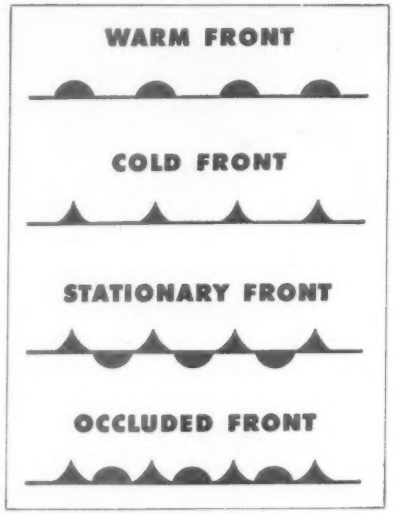
First, you know where the fronts are, and what kind of fronts they are.

Secondly, the isobars give you an approximate picture of the winds, because at an altitude of about 2,000 feet the winds tend to blow parallel with the isobars. The space between the isobars indicates wind velocity; the greater the distance between the isobars, the lighter the wind; close isobars mean strong wind.

This knowledge of wind direction is very important. In the northern hemisphere winds blow counterclockwise around a low pressure center. Therefore, in the northern hemisphere *if you have a tail wind the low pressure area is on your left. ALWAYS!*

But in planning a flight you need more information on the location of pressure centers than this thumb rule affords. Consequently, the aerologist shows you both the high and low pressure centers, which affords you the opportunity to take advantage of the generally good flying conditions of the highs, and to avoid the bad weather of the lows.

You know about the air masses, too. If you see the symbol mTK you know that the air mass has traveled from the tropics, mostly over ocean surfaces, and



Black and white symbols for fronts.

that it's a cold air mass. (You don't think you can get a cold air mass out of the Tropics? An air mass is "cold" or "warm" only in comparison with the surface it is over at the time. So, depending upon the ground surface temperatures where you are, "warm" air may come from the north, "cold" from the south).

You know that this mTK air mass under discussion is being heated by the surface below it, and therefore it may give you a bumpy ride. Being of maritime origin, the air is moist and this probably will mean showers, perhaps even cumulonimbus clouds, but surface visibility and cealing probably will be good.

The green-shaded areas and green symbols on the map show you where to expect precipitation, how much of it, and what kind.

In theory, fog areas on the weather map are indicated with red shading but many times the aerologist doesn't bother. You needn't worry about getting the necessary information, though. If there is no red shading on the map, fog will be shown by the fog symbols.

Isn't that about all you want to know from the aerologist about weather? It is not!

When he has reached this stage of his map drawing, the aerologist is just ready to go to work.

All he has done so far is show you current weather. You want to know what the weather is going to be. So now the aerologist takes the map you watched him draw and compares it with previous maps, the maps that were prepared at six-hour intervals from the regularly-assembled station reports. From this comparison he can tell how the weather has moved, and from his analysis of its movements he can make his estimate of how it is most likely to move in the immediate future.

The barometric tendency shows him whether pressures are increasing or decreasing, and how the pressure systems and fronts will move—whether the frontal systems are intensifying or dissipating. From his meteorological knowledge, coupled with his current information on weather over a widespread area, he can determine what changes in the existing weather will take place during the next 24 or 36 hours. On this basis he makes his forecast, and this forecast, in addition to what you already have read on the weather map, shows you the weather to be expected along any course to be flown. This is what enables you to make an intelligent flight plan.

There is one additional factor that is helpful to you in planning your flight. You know that generally winds become more westerly with increasing altitude, except in the tropics, and therefore you ought to make any extended westbound flight at relatively low altitudes whenever possible to avoid the high level head winds.

But there are other things you want to know about high level winds and this information is available in the weather office. Make use of it! There is no more important information in the business of flight planning.

The rule that winds parallel the isobars holds true only up to 2,000 or 3,000 feet. The pressure distribution changes above those levels, and consequently the direction and velocity of the upper winds are not determined by the pressures shown on the surface map.

But unless there is an overcast so great as to preclude observation, the force and direction of the upper winds are measured, reported, and charted so that you can tell what the winds are like at any altitude from 1,000 feet on up to 12,000 feet.

Get this information before you take off. Unless some weather obstruction intervenes (and the weather maps should tell you if it is going to) the winds aloft chart is your guide to the best altitudes at which to fly a given course, your insurance against the danger of running out of fuel, and your indicator for sending an accurate E.T.A.

Don't ever forget that your altimeter setting is a part of your necessary weather information. Your altimeter is nothing but a pressure gauge that reads less as your height from the earth increases and the pressure decreases.

But atmospheric pressure is not constant at any given altitude.

Since upper warm fronts are usually

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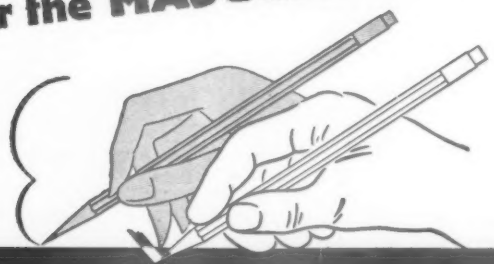

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This new propeller, made of Alcoa Aluminum by the McCauley Corporation, Dayton, Ohio, is far more efficient than conventional light-plane propellers. You get greater efficiency all around—shorter take-off runs, increased rate of climb, faster cruising speed.

These thin-section blades of Alcoa Aluminum are light, corrosion-resistant, durable . . . will not change dimension, swell or crack. The slight increase in cost is soon written off by absence of maintenance expense, by better performance.

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only 20 to 30 miles behind the occluded front which they accompany, aerologists have got into the habit of not indicating them on the weather map. Thus the broken red line will seldom be seen.

Make sure that you correct your altimeter setting at take-off, and get the aerologist's estimate for the setting at your terminal point. But at any time en route or on arrival, if you are in doubt of your actual altitude, ask on voice radio for a correction and don't come down to a dangerous level until you've got it!

When you fly with a constant reading on your altimeter, you are not flying at a constant altitude. You are flying at an elevation where the pressure is constant —in effect, flying along an isobar. During periods of high winds (which usually means bad weather) the isobars are closely spaced and it is quite possible to ride an isobar right into the ground.

Make sure that at take-off your altimeter is set at the actual field altitude above sea level, because only in this way can you standardize your altitude with all other aircraft which may be on instruments on the same airway.

It is quite proper to set your altimeter to zero if you are taking off for a local flight and returning to the same field. Frequently, however, young pilots on cross country flights set their altimeters to zero as they leave each field, instead of setting it to compensate for the field's relation to sea level. This is an excellent way of causing collisions, which are inevitable unless the altitude level of all planes on instruments is maintained constant.

Contact flying conditions are variable, so if you get a report that you have a 1,000-foot ceiling and three miles visibility at an airport, don't rely too much on their staying that way. If ceiling and visibility are close to the instrument limits, better play it safe and don't depend upon contact condition to remain that way. END

Letters

(*Continued from page 6*)

we are told we get one service point for every month we've wasted on "active duty," but no credit for the time we spent turning out fighter and bomber pilots.

We want to know why something isn't done about this situation. Cadets whom we taught to fly have been discharged, and some of their service points were accumulated while flying with us. Yet we don't get one point towards discharge for the job we did. Is there anyone who can do something about this?

PVT. ROBERT A. TOTH

Denver, Colo.

● The War Department has ruled that only service in active status with the armed forces may be counted in computing rating scores for discharge. According to War Department directives, each civilian flight instructor who had volunteered for, and was a member of, the Enlisted Reserve was given an opportunity at the time of his separation from such employment (1) to accept administrative discharge from his reserve enlistment; (2) to accept call to active duty in enlisted status for service with the Army Air Forces; and (3) if immediately employed by a commercial airline under contract with the Government or Air Transport command, to remain in inactive reserve status. These provisions were contingent upon release from this particular civilian employment by causes beyond his control (cutbacks in training programs, etc.) and not for disciplinary reasons. About all one can do toward rectifying the reserve vs. active service discrimination is to write to one's congressman.—ED.

NO SALE

Like a lot of other individuals who didn't get to zoom P-38s at Uncle Sam's expense, I wanted to fly. A distributor wasn't far away and I was invited to make a demonstration flight. I made arrangements to buy a few hours.

My past flying experience was extensive, though rusty. As an aviation editor, I had handled planes from puddle jumpers to B-17s on courtesy hops. However, I approached the distributor-pilot with all the humbleness of a beginner. By telephone he arranged for a half-hour's flight on Saturday morning which I was to pay for as part of my flying course.

When I arrived, the demonstrator pilot was not there, nor did he arrive all day. Introducing myself to the pilot instructor for the company, I found my name was not on the schedule for the day's flying. No arrangements had been made.

"Stick around," the pilot said. "I'll get you squeezed in somewhere."

Still waiting at two-thirty in the afternoon, I approached the pilot and asked how the schedule was working. He said:

"Don't think I'm going to be able to work you in today. Better make an appointment."

We agreed on 11 o'clock the next morning. I was there. The pilot had a student in the air and didn't land until 11:30. After going over details with his student, he loaded in a sight-seeing passenger, completely ignoring me. The passenger had walked up without any previous arrangements. The instructor knew I was there.

Including two round-trips to the airport, I spent one and a half days and didn't get off the ground. At noon I drove home, cancelled my insurance, tore up all the airplane literature, and started to figure what a swell automobile $3,000 would buy.

LAWSON MILLER

Los Angeles, Calif.

MORE SERVICEMEN OPERATORS

In your April issue we noticed that Mellor-Howard claimed their base to be the only one in the New York metropolitan area that is owned and operated exclusively by veterans.

Will you kindly add our name to the list since our airport is also owned and operated exclusively by veterans (Navy).

A. R. COZZOLINO, Treasurer
Aero Flying Service, Inc.

Lincoln Park, N. J. END

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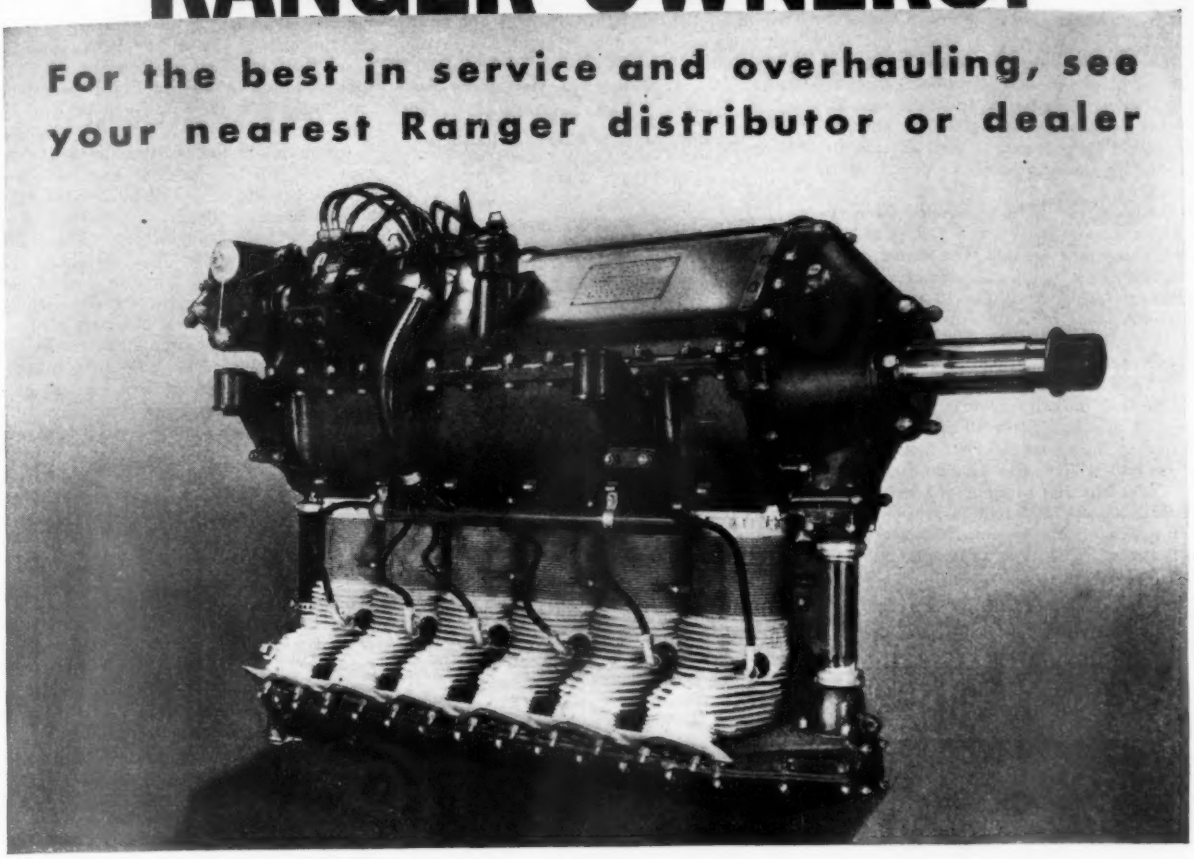

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RANGER AIRCRAFT ENGINES
Division of Fairchild Engine and Airplane Corporation, Farmingdale, Long Island

The Cessna 140

(*Continued from page 40*)

I visited the Cessna plant recently to fly the 140. While it is preferable that FLYING's test flights be made in production airplanes picked at random, the only 140 that was flyable at the time was the original prototype, NC-41684. If the production 140s perform as well as this airplane, Cessna can well be proud of its product.

FLYING's test flight was made from the Cessna airport in Wichita (altitude 1,400 feet above sea level). The temperature was 66°, dew point 37, altimeter setting 2,999, and the wind was 10 m.p.h. from 270°. At take-off, our gross weight was 1,424.5 pounds—25.5 pounds short of maximum. My companion on the flight was Don Flower, Cessna sales manager.

The 140 took off from the rough sod field in approximately 10 seconds from a standing start. Its most efficient climb is to be had at 70 m.p.h. indicated air speed at 2,250 r.p.m. I made several climbs from 2,000 to 3,000 feet above sea level, the average rate of climb working out to 650 f.p.m. (Cessna claims 680 f.p.m. at sea level).

To check the 140's cruising speed, a two-mile course lying up- and down-wind, was chosen. The up-wind leg was flown at 1,940 feet above sea level at 2,450 r.pm. at 104 m.p.h. The down-wind leg was flown at 1,820 feet and 2,450 r.p.m. at 124 m.p.h. This works out to an average of 114 m.p.h. Cessna's advertising claims "over 100 m.p.h." for cruising, and Cessna officials insisted that they would only claim 105 m.p.h. and that my figure of 114 m.p.h. was too high.

CESSNA 140 SPECIFICATIONS
Source: Cessna Aircraft Corporation.

Approved Type Certificate No. 768

Top speed	over 120 m.p.h.
Cruising speed	over 100 m.p.h.
Landing speed	41 m.p.h.
Cruising range	over four hours
Rate of climb (sea level)	680 f.p.m.
Service ceiling	15,500 feet
Gross weight	1,450 pounds
Empty weight	890 pounds
Fuel capacity	25 gallons
Span	32 ft. 10 in.
Length	21 ft. 6 in.
Height	6 ft. 3¼ in.
Wing loading	9.1 lbs. sq. ft.

The 140 has excellent stall characteristics. Using power but no flaps, I pulled the airplane up steeply and held it until it broke at about 42 m.p.h. indicated. Power off, the 140 stalled out at 50 m.p.h. indicated, without flaps. With flaps down and power off, the 140 should meet Cessna's advertised landing speed of 41 m.p.h. I was able to maintain altitude at 55 m.p.h. indicated, and 1,450 r.p.m.

Even when completely stalled, the 140 has excellent aileron control, despite the fact that the wing is not slotted. The nose drops straight ahead, but not steeply. I am told the airplane can be spun but that it is quite difficult, the pilot having to force it to do so. The CAA, however, stipulates that the 140 is "not to be spun with flaps down."

Maneuverability in the air is unusually good. All controls are equipped with ball or needle bearings, making the 140 one of the easiest airplanes to maneuver. The airplane is easily trimmed; the controllable tab on the elevator is operated with a small plywood wheel just to the right of the pilot's seat and near the floor. The tab is quite large and thus sensitive, the airplane responding quickly to only slight turns of the tab wheel. Aileron and rudder tabs are fixed.

Visibility in the air is about normal for a high-winged monoplane. It is excellent down, to the side, and forward. But—even though the 140 has two transparent green rectangles in the cabin roof—visibility above and behind this type of airplane is not too satisfactory. A faired-in wide-angle rear view mirror, like those used on our Army and Navy fighters, would help cut down the "blind" areas of a high-winged monoplane.

Both the 140 and 120 have Plexiglas all around—a great improvement over some of the cheap, eye-straining plastics so widely used in lightplanes today.

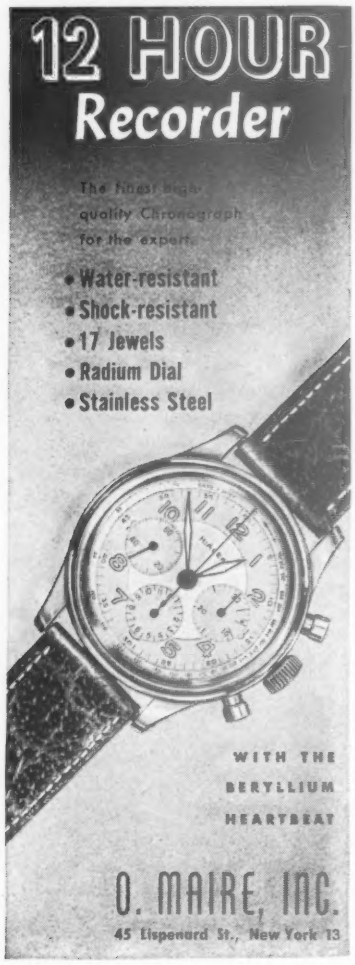
The 140's flap gives it a steep glide, an excellent feature in a landing, particularly from the standpoint of visibility. The flap can be lowered at a maximum air speed of 82 m.p.h. It is operated by a long handle that lies between the two seats and is pulled upward to lower the flap. I had a little difficulty in using this handle. It is locked in position by twisting the grip to the right until it catches, or to the left to release the flap. I tried that handle on several 140s and 120s and found that they all must be worked with special care so as to make sure the flap remains in the position desired. One gets the distinct feeling that a more simple, positive locking handle—like some of those used on automobiles—would be more satisfactory. I had the 140's flap suddenly pop up during a couple of landings because I had not twisted that hand grip properly. However, the 140 proved a pleasant surprise in this respect: a sudden retraction of the flap during a landing or take-off—an accident that would turn a pilot's hair white in some airplanes—has very little effect on the 140. The nose drop is barely noticeable.

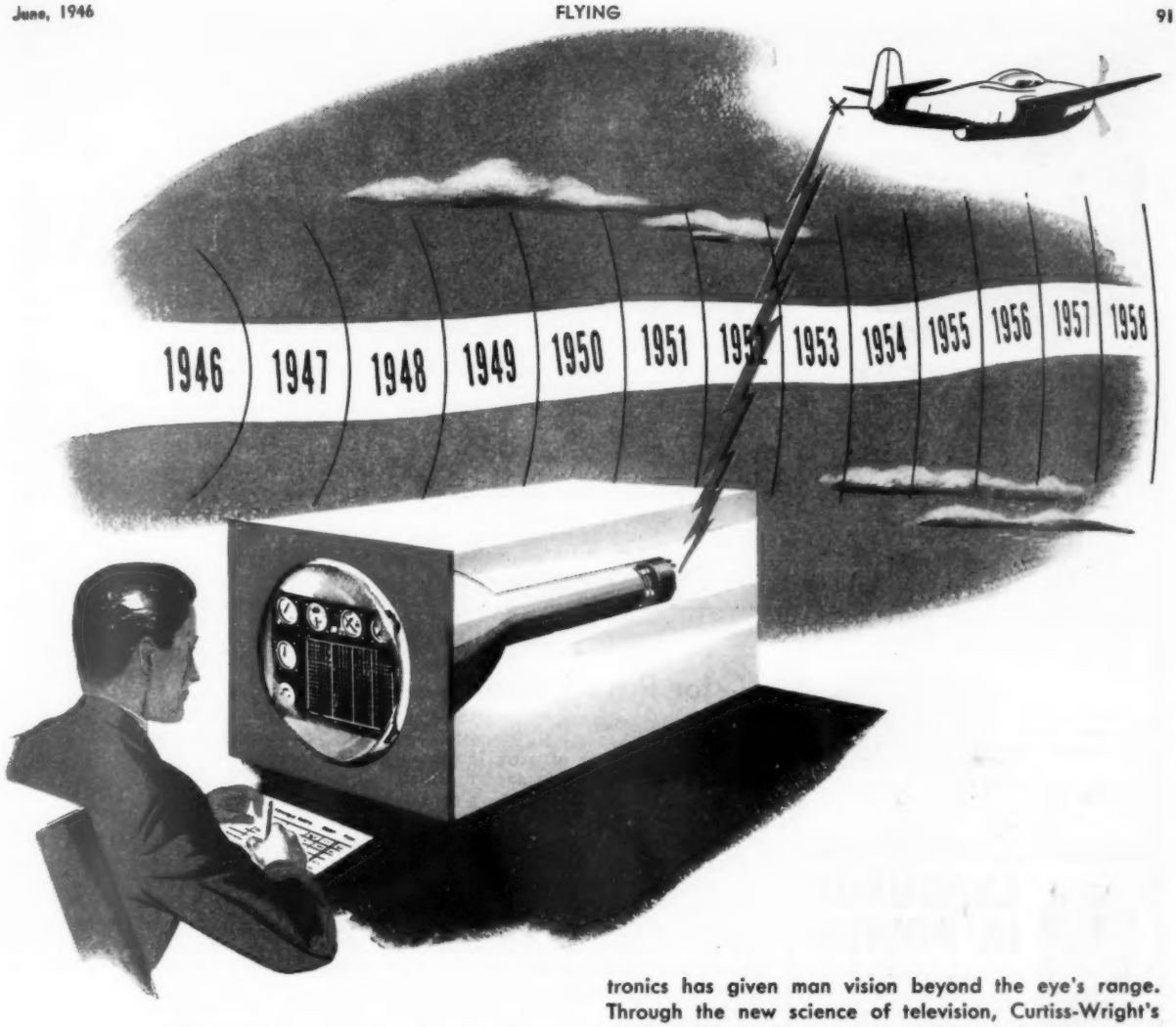
In several landings I deliberately levelled off high so as to let the airplane drop in hard on its novel chrome vanadium steel landing gear. It hit hard and you expect it to spring right back up in the air. Instead, the landing gear has a pronounced tendency to dampen out such a landing; I was able to make the airplane bounce only when I held the wheel forward. But the gear apparently will stand anything the airplane itself can take. Cessna engineers hoisted a 140 up in a hangar and dropped it from some incredible height just to see what the gear would take in a dead-weight fall. I'm told the gear legs flattened out until the fuselage all but bumped the floor. Then the gear pulled right back into its original shape with no damage whatever.

There is no doubt that this new landing gear is a distinct asset. I taxied the 140 fast over a rough field, turned it and braked it hard to a skidding stop. Under all these conditions the steel gear proved unusually solid and stable. The new Goodyear brakes are excellent and are operated by the toes from the rudder pedals. The parking brake is operated by pressing the toe brakes hard, then pulling out a small knob on the instrument panel until it catches and holds the brakes locked. That knob, however, is the same size as that used for carburetor heat and similar accessories and I found it difficult to determine when the brakes were locked and just how much of a pull was needed; I pulled one parking-brake knob clear out of the instrument panel trying to make it "take." Here again, I would prefer a simple, positive automobile-type parking-brake handle.

Maneuverability on the ground is excellent for the tail-down type of airplane. In addition to the unusual stability of the main landing gear, the steerable tail wheel and the excellent brakes combine to give the 140 very good ground maneuverability. Visibility over the nose while taxiing is above average.

The 140's cabin should appeal to the woman's eye for beauty and the man's eye for utility. The instrument layout is attractive and efficient. There are two





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One of the Airplane Division's wartime achievements, Telemetering—as this application of television is called—is destined to serve a vital role in the peace which can be assured only by continued maintenance of aerial supremacy. Literally, the Telemeter is focussed on *Tomorrow*, reading into the future for answers to the problems of peace.

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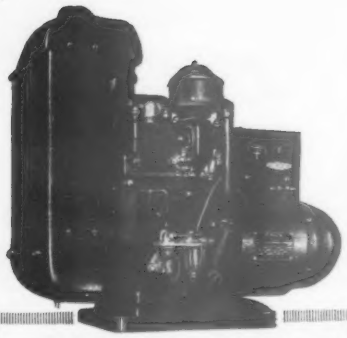

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large glove compartments, one to be used for radio if the owner desires. The conventional ignition switch is not used in either the 140 or 120. The master switch is turned on, then two separate magneto toggle switches are thrown before starting the engine.

The 140 sports a loud speaker for its radio; it is installed in the ceiling of the cabin behind the seat. However, the cabin noise in the airplane I flew was such that we had to use headphones to hear the control tower plainly. It may have been that the non-standard radio installed in this particular 140 did not have sufficient volume; Cessna claims the General Electric installation is quite satisfactory.

Baggage is carried in a substantial compartment directly behind the seat. The back of the seat hinges forward so that the baggage can be put in or removed. The seat itself is adjustable.

Cessna engineers have done an excellent job of designing maintenance accessibility into the 140. The engine cowl, for example, can be opened on both sides without even a screw driver. If extensive work must be done, the cowl can be completely removed without having to remove the Sensenich fixed-pitch propeller.

Standard equipment on the 140 includes air speed indicator, altimeter, ammeter, compass, fuel gauge, oil pressure and temperature gauges, tachometer, carburetor air filter, battery, dual controls, generator, navigation lights, starter, steerable tail wheel, hydraulic brakes, carburetor heater muff, landing light wiring and brackets, parking brake, shock-mounted instrument panel and flaps.

Altogether, the Cessna 140 and 120 should be given careful consideration by any prospective buyer of a new lightplane in this particular class. It is hoped, meanwhile, that Cessna officials will find popular names for their new airplanes; mere numbers, like 140 and 120, are dull and unappealing. This new lightplane of theirs could well be named the *Challenger*, for that is just what the 140 and 120 should prove to be to their competitors.

—MAX KARANT

New Code for Private Planes

(*Continued from page* 26)

ards for the strength of spars, longerons and structure to withstand resulting loads) have been influenced by a considerable study of foreign airworthiness codes. For many years the British, Dutch, Canadians, Germans and others have been designing and licensing their airplanes in two major categories, normal and acrobatic. These two categories seemed desirable to our aviation authorities because they simplified the operation of the private plane and helped the U. S. manufacturer to license his planes abroad. The whole thing aims at standardizing airworthiness requirements of lightplanes regardless of their origin.

Background for the new regulations comprises flight test data long on file correlated with that obtained from more recent tests. From CAA tests on 38 planes, ranging in gross weight from 1,300 to 4,000 pounds, came data that had been used to weed out planes for the pre-war Civilian Pilot Training Program. From the National Advisory Committee for Aeronautics came flight reports on lightplanes in the popular 1,000-pound (gross-weight) class.

These records not only served to assess the maximum maneuvering G for design purposes, but also showed that the pilot's handling skill and the speed he built up on entry into the maneuver had a marked effect on such load factors. In 1930 the British, experimenting with 14 different craft through 340 maneuvers, found that the average load factor for acrobatics properly performed was about 3 G. Though CAA and NACA tests confirmed this, instrument readings showed that rough handling of the plane during any maneuver (as might be done by a trainee pilot) could easily step up the G. A loop, for example, could be smoothly performed by a good pilot without exceeding 2.5 G. The same maneuver executed in the same airplane, but with rough handling technique, could easily make the load factor soar to 3.5 G. It also was found that the higher the speed of the maneuver the greater the ratio of difference in G between rough and smooth flight technique.

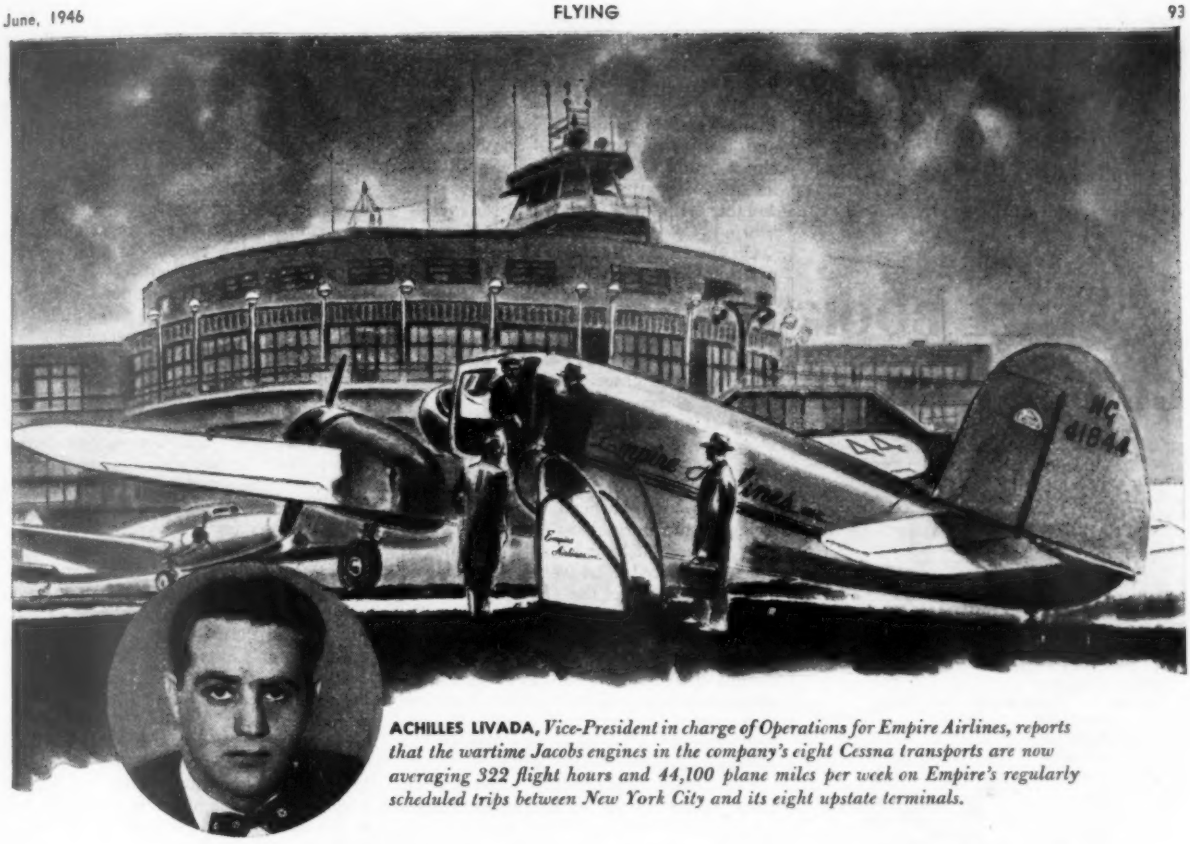
In short, these test indicated that G limitations for any plane category must be such that its structure will withstand all load factors, even when they result from faulty flight technique.

For the normal category plane, capable of being spun unintentionally, the minimum maneuvering G for design was frozen at 3.8 on planes with gross weights up to 4,100 pounds. For the non-spinnable, normal category ship a relaxation to 3.5 G was allowed for planes whose gross weights were below 7,150 pounds. Above these weights both types of normal category planes have progressively lower minimum design Gs, finally falling to 2.5 at 50,000 pounds gross.

Utility category planes, on the other hand, are designed for a minimum 4.4 G maneuvering load factor, regardless of weight. Acrobatic category planes are tops at 6 G at any weight.

Though there is a clear-cut load factor division between each category, the CAA will permit a manufacturer to license his plane in more than one category, providing that it is structurally sound and can pass the flight test peculiar to each class.

To take advantage of this multiple licensing system (a move calculated to boost sales) many lightplane manufacturers will have their products approved for different categories, depending on the gross weight at which each plane is flown. A utility plane grossing 3,000 pounds, for example, could be licensed also in the normal category if it met stress requirements for a gross weight of 3,450 pounds. This procedure, naturally, will require extra man-hours in engineering stress analysis. But it will in-



ACHILLES LIVADA, *Vice-President in charge of Operations for Empire Airlines, reports that the wartime Jacobs engines in the company's eight Cessna transports are now averaging 322 flight hours and 44,100 plane miles per week on Empire's regularly scheduled trips between New York City and its eight upstate terminals.*

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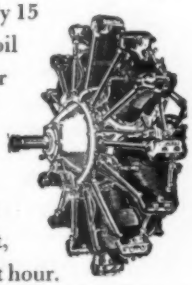

The R-755A is available for immediate delivery. Inquiries are invited . . . Jacobs Aircraft Engine Company, Division of Republic Industries, Inc.

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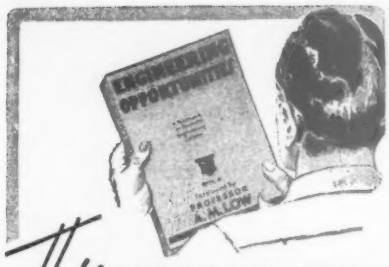

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crease the overall usefulness of the plane since the operator will be able to stow aboard extra useful load when he intends to make a straight cross-country flight. Planes used alternately in the normal and utility categories will require close check-up on weights—otherwise acrobatics may be attempted at the overload weight, with disastrous results a probability.

On the negative side of the picture the multiple-category plane may chalk up a slight structural weight penalty. For example, a normal category plane (designed for flying within the restrictions for that category only) will probably be structurally lighter than the multiple category plane, even though the latter is flown at a normal category weight. This is apparent from the fact that the multiple category airplane will have an engine mounting which is heavy and strong enough for acrobatic maneuvers. When flying in the normal category, this extra strength cannot be used, so it becomes so much additional dead weight. The lower structure weight of the plane licensed for only the normal class adds a bonus in extra payload or performance.

A rough guide to the permissible gross weight of a plane licensed in several categories can be calculated quickly from the variation of the load factor requirements. For example, a 2,000-pound gross weight airplane, licensed in the utility category (load factor 4.4 G), could meet normal (load factor 3.8 G) category restrictions for straight flight with the gross weight increased. The formula in this case would be $4.4/3.8 \times 2{,}000 = 2{,}300$ pounds. So 300 additional pounds of gasoline, equipment or payload could be carried.

Similarly, if the same plane were checked out for acrobatic category (load factor 6 G) flying, the gross weight would have to be reduced to satisfy this equation: $4.4/6 \times 2{,}000 = 1{,}470$ pounds. Or 530 pounds would have to be stripped off before all acrobatic maneuvers could be performed.

To prevent mistakes, a placard must be riveted to the structure in full view of the pilot. Normal category planes will be labelled: "No acrobatic maneuvers, including spins, approved." Utility plane placards will state: "No acrobatic maneuvers permitted except those listed below"—a complete list of maneuvers will be engraved on the panel. In addition, because flight tests showed maneuvering G tended to increase as the speed increased, the placard will list the "recommended entry speed" beside each permissible maneuver. The placard for the acrobatic plane will be similar, though with many more maneuvers permitted.

To further foolproof the operation of these planes, all flight and engine instruments must be prominently marked for safe, cautionary and dangerous operating limits. Airspeed indicators, for example, will be green banded over the normal flying range from stalling to cruising, with a white mark showing the safe flap-operating speed range. Above cruising speed, a yellow line will indicate caution. Red radial lines will mark absolute minimum and maximum flying speeds.

With the guesswork taken out of flying and maneuvering limitations, the category system promises to reach a new high in personal plane safety. Though the Civil Aeronautics Board has issued these new regulations, they are backed by the experience of the aircraft industry in the manufacture of military as well as civil airplanes. Before any of the requirements became law, they were carefully scrutinized and debated by industry committees under the sponsorship of the Aircraft Industries Association. Final results indicate that prospective pilots and operators can rest assured that postwar planes licensed under CAR will be as safe and as useful as the Government and industry can make them. END

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Report from Washington

(*Continued from page 35*)

you are single, $90 if you are married.

If you have been working on airplanes in the services and want a course to round out your qualifications for a license, it is doubly advisable to look up a CAA inspector who can advise you on what to study and how to prepare for exams. He might even tell you you're already qualified to take an A & E exam, although service men who can are the exception since most of their war experiences were in specialized fields.

And don't get too discouraged if there are delays. Gen. Omar Bradley got himself a bureaucratic bear by the tail when he stepped into the Veterans Administration and it'll be some time before things begin to smooth out; but we can report that he seems to be doing all right so far and things are improving daily. . . .

Oceanic Airmail

Speaking of airlines, they are, as you probably have heard, now flying airmail to and from the boys overseas under a Post Office contract. Reason: drastic reduction in the space available on Army planes. Pan American, TWA and American Overseas are flying 2,000 pounds of mail each trip to Europe and some of this correspondence is civilian. The lines are bringing an equal amount home each trip and recently the Army loaded a special TWA plane at Paris with 8,000 pounds.

During the early spring the mail situation in the Pacific got so bad that airmail was moving to the troops on surface craft. Some 3,000,000 letters were diverted from air travel in this way but not until CAB approves routes beyond Hawaii will Army be able to break the bottleneck by having the Post Office Department award contracts.

Dollars and the DC-3

From the Civil Aeronautics Board comes a compilation on the operating costs of a DC-3—the first line-up of figures of its kind, although they have long been available if you had the time and patience to plow through airline reports to the Board. Airlines were chosen from rough and even terrain areas and from high and low tax areas, to give you the over-all picture. The box-score:

Average cruising speeds—TWA 163 m.p.h., Eastern 152 m.p.h., Braniff 151 m.p.h., Delta 149 m.p.h.

Cost per hour of gasoline, including taxes: TWA $12.68, Eastern $12.38, Braniff $12.43, Delta $12.99, PCA $15.00.

Cost of oil per hour, including taxes: TWA 74 cents, Eastern 50 cents, Braniff 91 cents, Delta 63 cents.

Per-hour total flight operation cost, including maintenance and depreciation: TWA $54.87, Eastern $50, Braniff $49. Delta $51, and PCA $57.

Anvil Chorus

The first annual American Public Relations Association award for the best Federal job in public relations in 1945 went to the Civil Aeronautics Administration's Office of Aviation Information, which makes us very proud, being an alumnus of the outfit. Accompanying the award was a statue of an anvil, APRA's idea of a press-agent's Oscar. Nothing daunted, CAA now comes out with one of the most ambitious, and certainly one of the most handsome publications we have seen from the Government mill in a long time.

It's called "Realm of Flight"—all about the weather, with some excellent four-color illustrations—and is on sale at the Government Printing Office and leading book stores, price 60 cents. We understand the boys had a time selling the GPO on a four-color job but when Henry Wallace saw the illustrations he went to bat and the book as now published resulted. A total of 50,000 copies have been printed and it will be advertised with airport posters and leaflets, according to Ben Stern, head of the CAA public relations work.

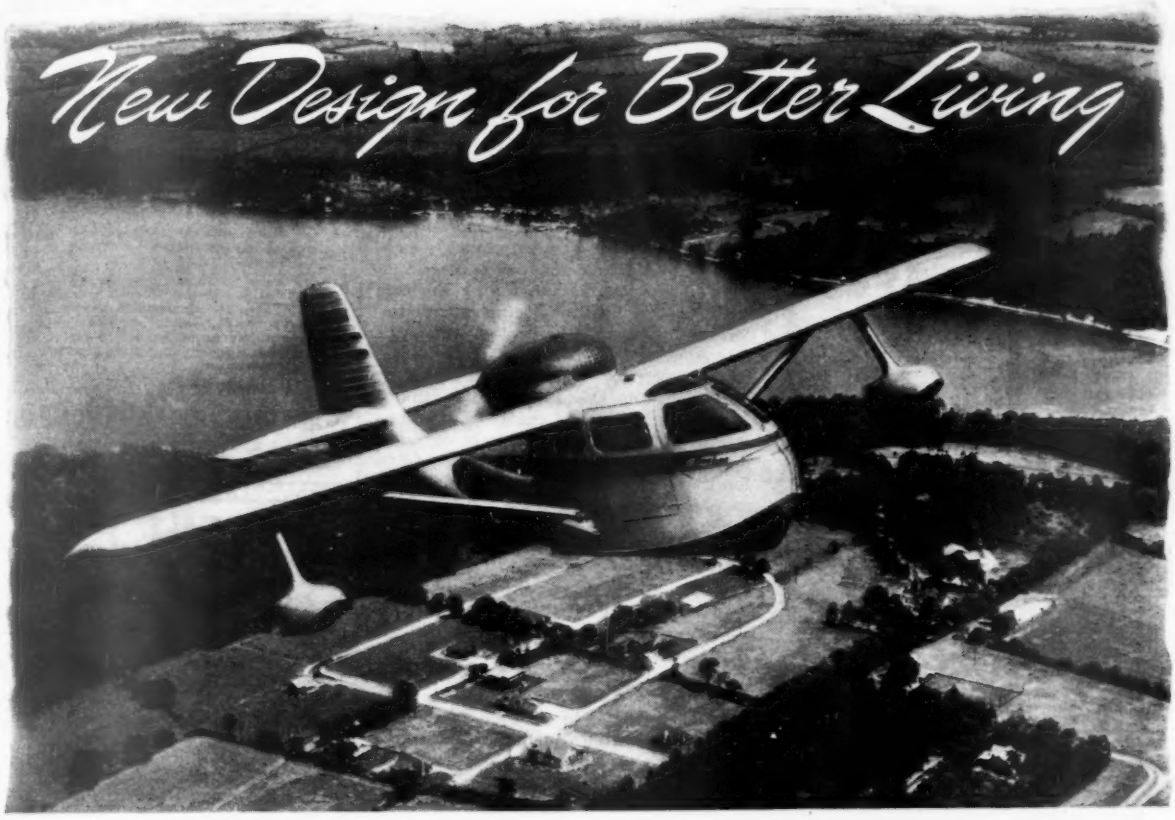
Credit for the art job in "Realm of Flight" goes to Joseph S. McCoy, another alumnus, until recently in charge of CAA Visual Services. Copy was written by George Sidney Stanton, a CAA aviation training service consultant and a frequent contributor to FLYING. Credit is also due to Ira Smith, chief of the CAA publications section. And speaking of credits, mark up a couple for Charlie Planck and Ray Nathan for their share in winning the APRA anvil.

Helicopters

We went up to Philadelphia a few weeks back to attend the second annual forum of the American Helicopter Society, and if you think conventional airplane people are enthusiastic, let some of these helicopter boys button-hole you next time you get a chance. They'll hangar-fly till nearly dawn and one of them with whom we shared a room—Frank T. Coffyn, that earliest of Early Birds and now a booster for Hillercopters—flew his model right into his dreams.

R. G. Anderson, president of the society, led off the meetings by announcing that the organization is offering its services to develop a patent pool to avoid the mistakes made in the early days of the automobile industry. Other speakers included Dr. Alexander Klemin on rotary wing developments to date and Grover Loening, who went to some length—with movies—to give a thorough picture of the research that has been done in the field during the war.

We didn't rush out and buy a new model but did come away convinced that the future of helicoptering is bright, especially in rescue and roof-top delivery fields. . . . The other day the first helicopter was offered for commercial use, a version of the four-place wartime Sikorsky R-5. It will be on the market during the summer. The new model, to be called the S-51, cruises at better than 80 m.p.h. with a range of approximately 240 miles. To show you how helicopters have come along, about four years ago the U. S. record for helicopter altitude was 75 feet and the longest flight about



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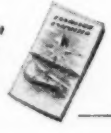

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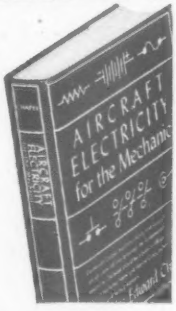

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Planes to Pasture

Anybody who flew them regrets that surplus fighters, bombers and other tactical aircraft are being knocked apart in a big way. But there is another and more romantic side to the story. "Name" planes are being left intact by the War Assets Administration, which can turn them over at nominal prices to any community wanting them for memorial purposes. Some cities have already made requests. Seattle gets a B-17 named *Five Grand*—the 5,000th Flying Fortress built in the Seattle Boeing plant; the *Swoose*, piloted early in the war by a Los Angeles ace, Col. Frank Kurtz, was flown there for memorial purposes by him early in the spring; the famous *Memphis Belle* has gone to pasture guess-where, and a search is being made for the *Fortress Chattanooga Choo-Choo* for that city. More than a dozen other surplus planes have been requested by other cities.

Briefings

Cancellation of war orders have, of course, played hob with aircraft production figures but spring reports indicate that 1946 isn't going to be such a bad year after all. Republic expects to deliver nearly $34,000,000 of military orders in 1946, not to mention production of a "substantial quantity" of *Seabee* amphibians. And from Douglas comes word of a backlog of more than $103,000,000 in commercial plane orders, plus others which have been added since the first of the year.

B. Allison Gillies has been appointed counsel to personal flyers for the sixth region, CAA, which includes California, Nevada, Utah and Arizona. He is the husband of Betty Gilles, who is also a noted private pilot. He succeeds Douglas Robinson of Tucson, Ariz., who is retiring from aviation.

It won't be long now before you can fly anywhere most any time on a U. S.-operated transport. Outstanding among the spring offerings of new destinations by air were American's extension of transatlantic service to include stops at Oslo, Norway, and the linking by TWA of what Tom Bell likes to call "the newest and oldest civilizations"—in sum, flights to and from Washington and Cairo. First flight was made by a 40-passenger *Skymaster*, named the *Sphinx*. Stop-overs have already been scheduled for New York.

Traffic congestion in the air isn't something of the future any more—it's already here. Conditions are already so bad around New York City that a committee to consider traffic problems has been appointed by T. P. Wright, CAA Administrator, to try to unsnarl the difficulties. Findings are expected to be the basis for solving similar difficulties when congestions occur elsewhere. Chairman of the committee is James Watson, Airport Traffic Control Inspector for CAA's first region. Airline, Army and Air Line Pilots Association representatives are also members. END

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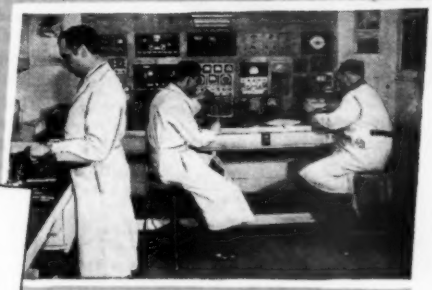

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The Case for the Pusher

(*Continued from page 50*)

with very high speed single-engined planes this deficiency is more than offset by the smooth airflow which the pusher maintains over parts of the airplane ahead of the propeller disc. With tractors, the propeller blasts a turbulent wake over a large portion of the airplane surface which adds up in extra skin-friction drag and decreased speed.

In twin-engined planes, with the power plants nested in the fuselage (XB-42 fashion) and the propeller mounted at the tail, an additional cut in drag is accounted for by the elimination of engine nacelles. For the XB-42, a 20 per cent lower drag coefficient has been estimated as a result of these features.

With the extra speed performance possible from pushers, military plane designers began to think of ways and means of overcoming the biggest mental and physical hazard to pusher progress—devising means for the crew to bail out without becoming entangled with the propeller. This knotty problem was solved by the development of a propeller jettisoning mechanism. Now on the latest Army pushers the pilot merely pulls a control, the propeller is released from its shaft and the crew is free to parachute away in safety.

For non-acrobatic civil airplanes, this propeller ejection mechanism is unnecessary; although for acrobatic pushers, a similar device may be required. In either case, evidence on civil airplane operation indicates that the personal plane pilot and passengers will have to worry more about the ordinary characteristics of pushers—getting used to the propeller being in the rear and being careful of backing into it when the plane is on the ground. Even smaller items can be a menace. One pusher plane manufacturer, anticipating an uneducated pusher public, fixed the side windows so they could not be opened. His very practical reason for this was to prevent cabin occupants from throwing things out of the windows in flight. Such objects may be whirled into the propeller blades where they can inflict serious damage and even necessitate a forced landing.

One of the most popular methods of keeping air travelers automatically clear of the pusher propeller when the ship is on the ground undoubtedly will be a twin tail-boom layout similar to that of the pre-war Stearman-Hammond. This design arrangement also provides a neat, streamlined cabin nacelle without the necessity of allowing extra cabin depth merely to carry the empennage. Pilots, however, may have to get used to some stalling of the fuselage nacelle when the plane is side-slipped. This stall, similar to that of a wing will cause a turbulent airflow through the propeller and an unpleasant propeller vibration.

When extra fuselage depth is required for some other reason (such as the elongation of flying boat hulls for efficient water operation), the conventional fuselage must be tapered down sharply to clear the pusher propeller. Such a design is represented in Republic's amphibian, the *Seabee*. By the use of propeller drive shafts and propellers mounted behind the tail, a wide variety of other external arrangements is possible. At least one designer of such a type has proposed a guard ring, mounted just clear of the propeller tips. By this device he hopes to retain the automatic safety feature of twin-boom design.

Most safety-minded pusher passengers will worry more over the grim thought that in a forced landing several hundred pounds of engine may come crashing forward into the cabin. It is evident to designers, however, that sufficient strength can be built into the engine and mounting to withstand the inertia forces which pitch the engine forward in a crash. Military flying during the war has provided interesting data on the decelerations that can be expected in forced landings. With this background of information, power plant structures can be safely designed to carry the resulting loads.

One method of solving this crash problem on military airplanes—a method which could be adapted to commercial use—is to match all deceleration loads with the strength of the armor plate behind the pilot. The pusher engine and its mounting is then merely designed for normal flight and landing loads. But the armor plate, which separates the engine from the pilot, is strengthened to prevent the engine from crashing through it during a forced landing. In civil airplanes the armor plate would be replaced by a reinforced firewall.

Similarly, on the front of the fuselage a bottom keel structure can be designed to withstand the shock of an emergency contact with the ground and prevent injury to cabin occupants. This keel, or longeron structure, could also be used to carry stresses from normal flight and landing so that the added weight would serve a useful purpose.

In addition to safety features, the design of the modern pusher will, in many cases, involve the use of an extension shaft between the engine and propeller. This will help to achieve a favorable center of gravity and wing location and will give extra cruising speed because of the smoother streamlining possible at the trailing edge of the cabin. Though this is a new feature for small civil airplanes, it has already proved itself on many military types.

One of the early Army planes with a shaft-driven propeller, showed a tendency for the shaft to vibrate when the engine was throttled back. Though no mechanical trouble resulted, pilots experienced a bit of mental discomfort wondering if the shaft was on the verge of breaking loose. Such a situation, of course, would be undesirable on commercial, passenger-carrying planes. But the fact that it can be eliminated is proved by the projected DC-8, the commercial version of the XB-42. Shaft vibration has been eliminated on the DC-8 even though it has 60 feet of shafting, reaching from the engines in the forward part of the fuselage to the contra-rotating propellers aft of the tail.

Extension shafting, once thought im-

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Q. What type of helicopter is being produced?

A. The first Bell helicopter to go into production is the two-place Model 47. *Nearly 500 will be completed this year.* Larger models are on the way.

Q. Who will get helicopters first?

A. Model 47 helicopters meet requirements for government agencies, disaster relief, commerce, business and industry. Organizations of this type will receive first priority.

Q. When will the first helicopters be available?

A. Deliveries will start in mid-summer and continue at a steadily increasing rate.

Soon you'll see Model 47 helicopters fulfilling the vast number of services at which they excel. For helicopters perform hundreds of practical, everyday jobs no other form of transportation can touch. They accomplish these tasks swiftly . . . flying from any point to any destination, instead of from airport to airport. For further information about Bell helicopters, write the Helicopter Division of Bell Aircraft Corporation.

The Bell Model 47B helicopter—powered by a six cylinder Franklin Aircooled engine of 175 H.P.— has a gross weight of 2100 pounds, including a useful load of 607 pounds. It utilizes a patented two-bladed rotor and gyroscopic stabilizer. The Model 47 is noted for smoothness of flight and ease of control.

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On March 8, 1946, Bell Aircraft received a CAA Airworthiness Certificate on its Model 47 helicopter, and CAA license number NC 1H, *the first helicopter "NC" license ever issued.* These certificates were issued after exhaustive flight tests in which the Model 47 met every airworthiness requirement of the CAA.

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practical because of possible deflections in light aircraft structures and consequent binding of the shaft, has proved to be extremely reliable. Throughout thousands of flying hours on the Allison-powered, Bell fighting planes—*Airacuda*, *Airacobra* and *Kingcobra*—not one report of shaft failure in flight has been made to the manufacturer.

With these basic design features solidly verified by military progress, the conversion of the pusher into personal-plane use in the post-war era is already well underway. The excellent view afforded by the egg-shaped fuselage nose is fast becoming a design necessity as the airways become more crowded. Experimental Piper, Republic, Lockheed and Consolidated Vultee pushers are already flying—and there are many more to come. END

Tips on Touring South America

(*Continued from page* 21)

Another good thing to have along is some good non-irritant nose wash. If the trip lasts any length of time you'll probably get a cold—temperatures on the ground and in the air contrast much more than in North America. A cold means a stopped-up nose and, if you fly at any altitude, the nose stops up the ears and first thing you know you have a blinding headache.

Take some halizone tablets. They're the things you put into native water until the water smells of chlorine and tastes like hell. But they protect you from disease and that's worth taking a bit of the bad taste.

In the same department, take along a couple of quarts of emergency water and try not to use it until you have to. If you should happen to be forced down it might mean the difference between life and death. For ordinary drinking, my recommendation is beer. Never—and I do mean never—drink local water unless it is first boiled. Use caution drinking the bottled water found in passenger stations along the way. The fact that it is bottled does not guarantee its purity.

Atabrine or quinine, if you should get a touch of malaria, are as indespensible as paragoric and bismuth for dysentery. Some doctors will tell you that you take it while in a malarial area and others say wait until you have a fever. Personally, I believe you're just as well off if you stay away from the stuff until you're hit. I've never been hit. . . . Find out from the Public Health Service before you leave just what "shots" you will need for the countries you will fly through. For any of the South American countries you should have typhoid, small pox, anti-tetanus, yellow fever and possibly typhus—and allow yourself a week to recover from the injections.

Not exactly under the heading of medicine, but an excellent preventive of disease, is a set of Army emergency rations. I always have some in the cockpit. They aren't exactly appetizing but in an emergency they may look like a feast. I re-

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call going into a bar in Tapachula, Mexico, a few years back before the town got its present excellent hotel and seeing a rat munching at food piled on the backbar. I called it to the attention of the waiter—and he smiled. Army rations, as I am telling you, often seem very appetizing indeed. Never eat food that isn't well-cooked and never eat green vegetables.

In case of a forced landing, I also carry a machete, a good pocket compass and an Army or Navy jungle book. All are necessities if you get into real trouble.

For clothes, I dress lightly and take a lot of care in picking out a pair of sturdy, not fancy, shoes reaching over the ankles to keep off sand fleas and chiggers. But also take along a rain coat and a jacket—it gets chilly at 3,000 to 4,000 feet, even over a tropic jungle.

One more thing and you're on your way. Be prepared to clip mosquitoes before they clip you. I take along a good insect repellant, a good insecticide and a spray gun. I always spray the plane before take-off and before going to sleep in it if I have to sleep in it. I've found that you can make a hit with customs officers in a new country by spraying the cabin and cockpit just before landing. One word about customs officials—you will find them helpful and courteous and you should be the same way. There are certain things which have to be done going in and out of a country and they may seem unnecessary and difficult. Always be sure your entry and exit papers are properly cleared.

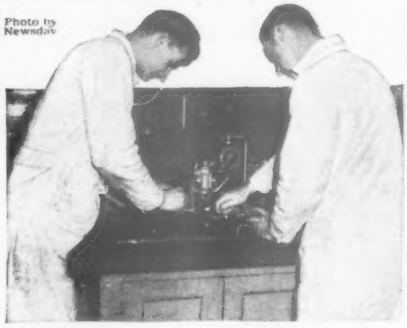
If going abroad, of course, you will have to check with the State Department. I also would advise checking thoroughly with CAA so that they can clear you in and out of all countries you intend to visit before you leave here. The more official-looking papers you can flash in South America, the better you get along with everyone.

And now—saving the best for the last—let's take a look at the country, the climate and the people. The latter are very friendly and will become more so if you try to understand them. Take along a little book in conversational Spanish and Portuguese and try to make them understand your attempts at their language. Sign language, you will find, is something that comes naturally and is easily understood. If you kick and scream, they'll kick and scream, too. One good thing to remember is that they think North Americans have a hatful of money (why would they be flying that beautiful airplane if they didn't?) and that a Yankee hates to bargain. You'll encounter these attitudes perhaps first when you try for your first ride from airport to town. If you don't make your deal with the driver in advance, you'll wind up by buying his Model T, Maxwell or Essex—which, like taxi drivers the world over, is exactly what he hopes to charge. But, after you make the deal, don't be sore if the price seems high. If you know the lingo, your taxi driver can explain to you that repair parts for his jalopy are practically impossible to get, that his business risks are therefore high, and that—except near oil wells—his gas costs him as high as $4 a gallon. Also remember that getting from the field to town back home is not, shall we add, an easy problem.

That brings us to what a trip will cost you. Best rule-of-thumb I can give you on it is that you figure your plane to cost you $5 per hour in the air and yourself at about $10 a day. Unlike the taxi driver, you will average out all right on your gas, getting it for buttons in the oil countries to make up for the top prices in mid-jungle. Hotels run from $5 to $9 per couple for room and two meals. Meals are generally cheaper than in North America except in Mexico City and Venezuela, where prices are very high. Offsetting this are Rio and Buenos Aires, where you can get more steak for a dollar than you can eat in a week. I know one Buenos Aires restaurant where the chef serves you with a piece of baby beef bigger than a $2 steak, U. S.-style, the minute you come into the restaurant. Turns out this is just a sample. Later he brings you the real thing!

It's hard to generalize about the flying conditions, but here are a few tips: Argentina is one big landing field. Its weather is about the same as ours with the seasons reversed. The best time to get down there is during the U. S. winter. It seems that bad weather moves in quicker and the "fronts" are more vio-

(*Continued on page* 108)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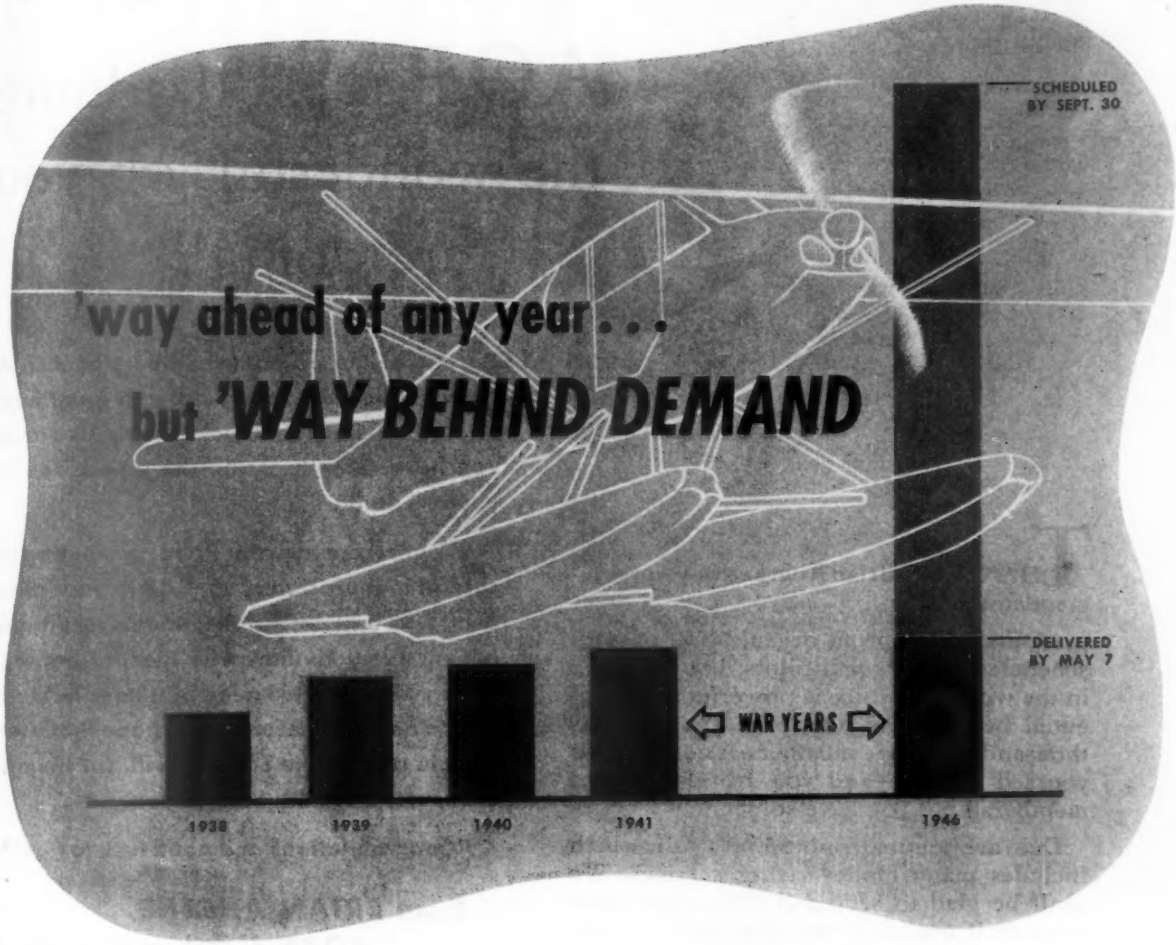

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(*Continued from page* 104)

lent, but during the country's summer time, flying is usually ideal.

Stay away from the Caribbean during the hurricane season in the late summer and early fall. Stay away from Peru and Bolivia unless you've got a plane that's at home at 16,000 feet or better. That's the altitude to get into La Paz in good weather; often you have to go to 18,000 or 19,000. Landing fields are correspondingly high. It takes a DC-3 from 50 to 55 seconds to take off at La Paz—when the wind's right.

Winds and weather are tricky all over South America. When staying overnight in the open, chock your plane with logs or rocks and cut your own stakes and drive them deep into the ground. Use a good, husky rope. If you don't you may have to dig your plane out of the jungle one fine morning.

The Amazon always has its intertropical front, sometimes in the form of a 700-mile area of rain and other times nothing but scattered clouds. Be careful of tropical rain and do your flying through it early in the morning and up until noontime. On one occasion, I found it necessary to increase the power in a Fairchild 100 r.p.m. to hold altitude. Visibility is where you find it. Accurate navigation is a must.

But it's fun—don't miss it if you can make the trip.

And while you're down there, you might look up what for my money is the kind of an airport location cities in this country should copy. It's the field at Rio de Janeiro and is five minutes from the heart of town.

You'll find pals wherever you stop. You may not speak the same tongue, but your airplane will be a language understood everywhere. It will be your "open sesame" to lands and sights you will never forget. END

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